平成19年度国土交通省補助事業
木造住宅生産体制整備事業

中小住宅生産者による
木造住宅生産体制整備事業報告書

（アジア木造建築フォーラム）

平成20年3月

財団法人　日本住宅・木材技術センター

目次

１章　業務の目的と概要

１．１　業務の目的

アジア地域においては、高温多湿な気候のもと、我が国をはじめ古くから優れた木造建築技術・木造建築文化が発達し、これを支える技術者等も存在し木造技術を継承してきた。

一方、地球環境問題が喫緊の課題となっている現在、環境負荷の少ない木造建築の意義があらためて注目されているところである。

アジア木造建築フォーラムは、このような状況の中で、アジア各国において木造建築の建設・研究・普及等の最前線で活躍している方々が一堂に会し、各国の現状や課題等について相互に意見交換を行うことにより、今後のアジア地域での良質な木造建築の普及に向けた問題意識や認識の共有を図るものである。

１．２　実施体制

本業務を実施するために、アジア木造建築フォーラム実行委員会を設置し、企画検討を行った。

アジア木造建築フォーラム実行委員会

構成：国土交通省
林野庁
文化庁
(財)日本住宅・木材技術センター
建築・住宅国際機構
(財)日本建築センター
(財)ベターリビング
(財)住宅保証機構
(社)全国中小建築工事業団体連合会

１．３　日程・開催場所

日　　程：２００７年１１月２７日(火)～２８日(水)
会　　議：三田共用会議所（２７日）
現地視察：埼玉県（２８日）
所沢市民体育館（近年の技術開発による大規模木造施設）
川越市（伝統的な木造建築物の街並み保存）
ものづくり大学（ものづくりに携わる技術者養成機関）

２章　会議の実施報告

２．１　開催日時・場所

２００７年１１月２７日(火)　三田共用会議所

２．２　参加国

日本、インド、インドネシア、韓国、マレーシア、ミャンマー、ネパール、フィリピン、ベトナム

２．３　会議の概要

アジア８カ国から木造建築の建設・研究・普及等の最前線で活躍している方々13名を招致し、パワーポイント等を使って各国の現状や課題等について発表し、意見交換を行った。

メインテーブル27名、その他参加者21名

２．４　タイムスケジュール

10:00～10:10　開会挨拶　　金子大臣政務官
10:05～10:20　来賓挨拶　　木造住宅等振興議員連盟
10:10～10:20　参加者紹介　　事務局
10:20～10:45　趣旨説明、議事紹介
　　木造建築物の意義　循環型資源としての木材の利用など有馬座長
10:45～11:10　インドにおける木造建築物の現状と課題　　インド
11:10～11:35　インドネシアにおける木造建築物の現状と課題　インドネシア
11:35～12:00　韓国における木造建築物の現状と課題　　韓国

12:00～13:30　昼食　於　三田共用会議場　三田ルーム

13:30～13:55　ミャンマーにおける木造建築物の現状と課題　ミャンマー
13:55～14:20　マレーシアにおける木造建築物の現状と課題　マレーシア
14:20～14:45　日本における木造建築史・伝統的建築物等の保存修復について
　　後藤治　先生
14:45～15:10　ネパールにおける木造建築物の現状と課題　ネパール
15:10～15:35　日本における地域型の木造住宅について　　三井所清典　先生
　　～山古志村における震災復興住宅を事例に～

15:35～16:05　ティータイム　於　三田ルーム

16:05～16:30　フィリピンにおける木造建築物の現状と課題　フィリピン
16:30～16:55　ベトナムにおける木造建築物の現状と課題　ベトナム
16:55～17:20　日本における木造建築技能者の現状・課題　藤澤好一　先生
17:20～17:30　総括　有馬座長

※　発表時間には質疑応答を含む

18:00～19:30　懇親会　於　三田ルーム

表 2.5.1 参加者名簿

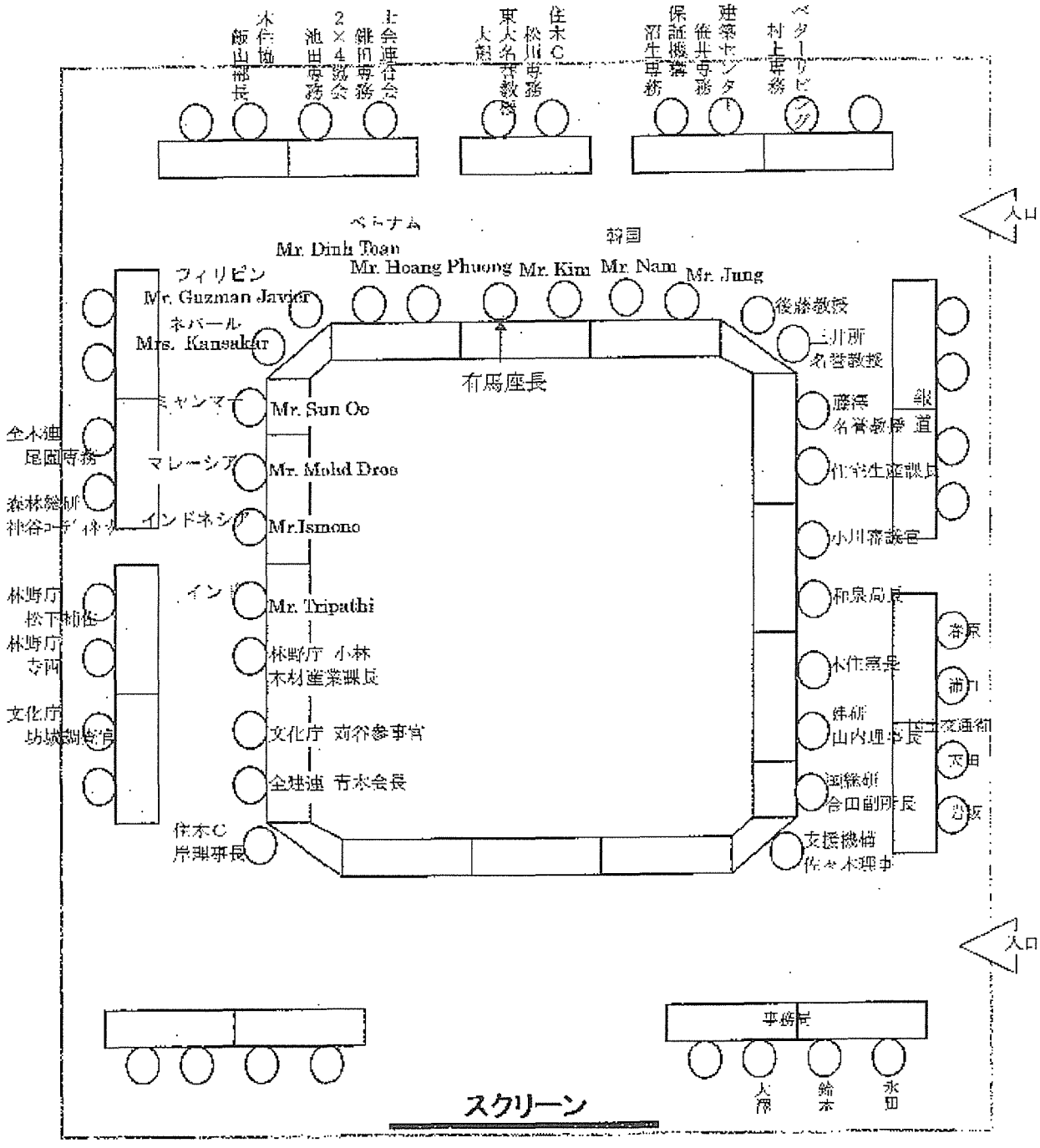
		国名	国名	団体名	団体名(英語)	役職	役職(英語)	氏名	氏名(ローマ字)
1	メインテーブル	インド	India	住宅都市開発公社	Housing and Urban Development Corporation Ltd.	経営企画部長	Director Corporate Planning	Mr. SK Tripathi	Mr. SK Tripathi
2	メインテーブル	インドネシア	Indonesia	建築環境開発課副課長(公共事業省)	Ministry of Public Works	建築環境開発課副課長	Directorate for Building and Neighborhood	Mr. Yahmo Ismono	Mr. Yahmo Ismono
3	メインテーブル	マレーシア	Malaysia	住宅・地方政府省	Ministry of Housing and Local Government	プロジェクト実施・管理課長	Director, Project Implementation and	Mr. Tuan Haji Ir. Mohamad Nor	Mr. Tuan Haji Ir. Mohamad
4	メインテーブル	ミャンマー	Myanmar	ミャンマー建築家協会	Association of Myanmar Architects	事務局長	Secretary General	Mr. Sun Oo	Mr. Sun Oo
5	メインテーブル	ネパール	Nepal	Tribhuvan大学工学部建築学科	Tribhuvan University	教授	Professor Department of Architecture &	Mrs.Dan Heera Kansakar	Mrs.Dan Heera Kansakar
6	メインテーブル	フィリピン	Philippines	Javier社	Javier Design Studio	副社長	Vice President	Mr. Joseph JAVIER	Mr. Joseph JAVIER
7	メインテーブル	韓国	Republic of Korea	建設交通部	Ministry of Construction & Transportation	建築企画チーム長	Dirctor Architecture Plannnig Team	カン・ビョンオク	Mr. Kan Byung-ok
8	メインテーブル	韓国	Republic of Korea	韓国木造建築デザイン協会	Korea Wood Building Design Association	会長	President	キム・ジンヒ	Mr. Kim Jin Hee
9	メインテーブル	韓国	Republic of Korea	建設交通部	Ministry of Construction & Transportation	建築企画チーム課長補佐	Deputy Dirctor Architecture Plannnig	チョ・ハングォン	Mr. Cho Han-kwon
10	メインテーブル	韓国	Republic of Korea	建設交通部	Korea National Housing Corporation	住宅企画チーム課長代理	Deputy Manager of Housing Plannig Team	チョン・スンホ	Mr. Jung Seung-Ho
11	メインテーブル	韓国	Republic of Korea	韓国木造建築デザイン協会	Korea Wood Building Design Association	副会長	Vice President	ナム・ヨンホ	Mr. Nam Young Ho
12	メインテーブル	ベトナム	Viet Nam	建設省建築研究所	National Institute of Architectural Research	課長	Director	Mr. Nguyen Dinh Toan	Mr. Nguyen Dinh Toan
13	メインテーブル	ベトナム	Viet Nam	建設省建築研究所	National Institute of Architectural Research			Mr. Pham Hoang Phuong	Mr. Pham Hoang Phuong
14	メインテーブル	日本	Japan	木造住宅等振興議員連盟	League of Diet members promoting wooden housing	事務局長	Secretary General	市川 一朗	Ichiro Ichikawa
15	メインテーブル	日本	Japan	東京大学	University of Tokyo	名誉教授	Professor Emeritus	有馬 孝禮	Takanori Arima
16	メインテーブル	日本	Japan	芝浦工業大学	Shibaura Institute of Technology	名誉教授	Professor Emeritus	三井所 清典	Kiyonori Miisho
17	メインテーブル	日本	Japan	芝浦工業大学	Shibaura Institute of Technology	名誉教授	Professor Emeritus	藤澤 好一	Yoshikazu Fujisawa
18	メインテーブル	日本	Japan	工学院大学建築都市デザイン学科	Kogakuin University	教授	Professor	後藤 治	Osamu Goto
19	メインテーブル	日本	Japan	(財)日本住宅・木材技術センター	The Foundation of Japan Housing & Wood Technology Center(HOWTEC)	理事長	President	岸 純夫	Sumio Kishi
20	メインテーブル	日本	Japan	(社)全国中小建築工事業団体連合会	Federation of all Japan Builders Association	会長	Chairman	青木 宏之	Hiroyuki Aoki
21	メインテーブル	日本	Japan	国土交通省	Ministry of Land, Infrastructure and Transport	政務官	Parliamentary Secretary for Land, Infrastructure and Transport	金子 善次郎	Zenjirou Kaneko
22	メインテーブル	日本	Japan	国土交通省	Ministry of Land, Infrastructure and Transport	住宅局長	Director-General, Housing Bureau	和泉 洋人	Hiroto Izumi
23	メインテーブル	日本	Japan	国土交通省	Ministry of Land, Infrastructure and Transport	大臣審議官	Deputy Director-General for Building Administration, Housing Bureau	小川 富由	Tomiyoshi Ogawa
24	メインテーブル	日本	Japan	国土交通省	Ministry of Land, Infrastructure and Transport	住宅生産課長	Director, Housing Production Division, Housing Bureau	坂本 努	Tsutomu Sakamoto
25	メインテーブル	日本	Japan	国土交通省	Ministry of Land, Infrastructure and Transport	木造住宅振興室長	Director, Wooden Housing Promotion Office, Housing Bureau	越海 興一	Kouichi Koshiumi
26	メインテーブル	日本	Japan	林野庁	Forestry Agency	木材産業課長	Director, Wood Industry Division, Forest Policy Planning Department	小林 忠秋	Tadaaki Kobayashi
27	メインテーブル	日本	Japan	文化庁	Agency for Cultural Affairs	文化財部参事官(建造物担当)	Derector, Architecture and Other Structures Division	苅谷 勇雅	Yuuga Kariya
28	会議参加	日本	Japan	国土交通省	Ministry of Land, Infrastructure and Transport	建築指導課	Director for Internatinal Building Codes Coordination, Housing Bureau	春原 浩樹	Hiroki Sunohara
29	会議参加	日本	Japan	林野庁	Forestry Agency	木材産業課	Deputy Director, Wood Industry Division, Forest Policy Planning Department	松下 英之	Hideyuki Matsushita
30	会議参加	日本	Japan	林野庁	Forestry Agency	木材貿易対策室	Chief Official, Wood Products Trade Office	寺西 哲子	Takako Teranishi
31	会議参加	日本	Japan	文化庁	Agency for Cultural Affairs	文化財部参事官付	Senior Specialist, Architecture and Other Structures Division	坊城 俊成	Toshinari Boujou
32	会議参加	日本	Japan	国土技術政策総合研究所	National Institute for Land and Infrastructure	副所長	Deputy Director-General	合田 純一	Junichi Gohda
33	会議参加	日本	Japan	(独)建築研究所	Building Research Institute(BRI)	理事長	Chief Executive	山内 泰之	Hiroyuki Yamanouchi
34	会議参加	日本	Japan	(独)建築研究所	Building Research Institute(BRI)	理事	Deputy Chief Executive	村岸 明	Akira Muragishi
35	会議参加	日本	Japan	(独)住宅金融支援機構	Japan Housing Finance Agency	理事	Senior Exective Deirector, Member of the	佐々木 宏	Hiroshi Sasaki
36	会議参加	日本	Japan	(独)住宅金融支援機構	Japan Housing Finance Agency	CS推進部技術支援グループ長	Chief Director, Technical Supporting Group, CS Department	仲田 正徳	Masanori Nakata
37	会議参加	日本	Japan	(財)ベターリビング	Center for Better Living	専務理事	Executive Director	村上 純一	Junichi Murakami
38	会議参加	日本	Japan	(財)住宅保証機構	Organization for Housing Warranty	専務理事	Executive Director	沼生 哲男	Tetsuo Numaoi
39	会議参加	日本	Japan	(財)日本住宅・木材技術センター	The Foundation of Japan Housing & Wood Technology Center(HOWTEC)	専務理事	Executive Director	松川 隆行	Takayuki Matukawa
40	会議参加	日本	Japan	東京大学	University of Tokyo	名誉教授	Professor Emeritus	大熊 幹章	Motoaki Okuma
41	会議参加	日本	Japan	(社)日本木造住宅産業協会	Wooden Home Builders Association of Japan	技術開発部長	Division Manager	飯山 道久	Michihisa Iiyama
42	会議参加	日本	Japan	(社)日本ツーバイフォー協会	Japan 2×4 Home Builders Association	専務理事	Executive Director	池田 富士郎	Fujiro Ikeda
43	会議参加	日本	Japan	(社)全国木材組合連合会	Japan Federation of Wood Industry Associations	専務理事	Executive Director	尾園 春雄	Haruo Ozono
44	会議参加	日本	Japan	日本建築士会連合会	Japan Federation of Arckitecto and Engineers Association	専務理事	Executive Director	鎌田 宜夫	Yoshio Kamada
45	会議参加	日本	Japan	森林総合研究所	Forestry and Forest Products Research Institule	研究コーディネータ	Principal Research Coordinator	神谷 文夫	Fumio Kamiya
46	会議参加	日本	Japan	(財)日本建築センター	The Building Center of Japan	専務理事	Executive Director	笹井 俊克	Toshikatsu Sasai
47	会議参加	日本	Japan	木造住宅等振興議員連盟	League of Diet members promoting wooden housing			逢沢 一郎	Ichiro Aisawa
48	会議参加	日本	Japan	木造住宅等振興議員連盟	League of Diet members promoting wooden housing			井上 信治	Shinji Inoue
49	懇親会	日本	Japan	(財)日本建築センター	The Building Center of Japan	理事長	President	立石 真	Makoto Tateishi
50	懇親会	日本	Japan	(財)住宅保証機構	Organization for Housing Warranty	理事長	President	羽生 洋治	Hiroharu Habu
51	懇親会	日本	Japan	国土交通省	Ministry of Land, Infrastructure and Transport	建築指導課長	Director, Building Guidance Division, Housing Bureau	水流 潤太郎	Juntaro Tsuru
52	懇親会	日本	Japan	(社)全国中小建築工事業団体連合会	Federation of all Japan Builders Association	専務理事	Executive Director	大槻 誠治	Seiji Ohtsuki
53	懇親会	日本	Japan	(財)日本建築センター	The Building Center of Japan			佐藤 英明	Hideaki Sato
54	懇親会	日本	Japan	(財)日本建築センター	The Building Center of Japan			寺川 ときは	Tokiwa Terakawa
55	懇親会	日本	Japan	(財)日本建築センター	The Building Center of Japan			武田 充弘	Mitsuhiro takeda
56	懇親会	日本	Japan	(財)住宅保証機構	Organization for Housing Warranty			脇田 修	Osamu Wakita
57	懇親会	日本	Japan	(財)住宅保証機構	Organization for Housing Warranty			篠塚 重夫	Shigeo Shinozuka
58	懇親会	日本	Japan	(財)住宅保証機構	Organization for Housing Warranty			大坂 正	Tadashi Osaka

59	懇親会	日本	Japan	(財)ベターリビング	Center for Better Living			清水 一郎	Ichiro Shimizu
60	懇親会	日本	Japan	(財)ベターリビング	Center for Better Living			大野 謙三	Kenzo Oono
61	懇親会	日本	Japan	(財)ベターリビング	Center for Better Living			クリフィス 瑞枝	Griffiths Mizue
62	懇親会	日本	Japan	(財)日本住宅・木材技術センター	The Foundation of Japan Housing & Wood Technology Center(HOWTEC)			増村 浩	Hiroshi Masumura
63	懇親会	日本	Japan	(財)日本住宅・木材技術センター	The Foundation of Japan Housing & Wood Technology Center(HOWTEC)			杉山 慎吾	Shingo Sugiyama
64	懇親会	日本	Japan	(財)日本住宅・木材技術センター	The Foundation of Japan Housing & Wood Technology Center(HOWTEC)			亀下 英次郎	Eijiro Kameshita
65	懇親会	日本	Japan	(財)日本住宅・木材技術センター	The Foundation of Japan Housing & Wood Technology Center(HOWTEC)			高橋 典之	Noriyuki Takahashi
66	懇親会	日本	Japan	(財)日本住宅・木材技術センター	The Foundation of Japan Housing & Wood Technology Center(HOWTEC)			石田 孝次	Kouji Ishida
67	懇親会	日本	Japan	(財)日本住宅・木材技術センター	The Foundation of Japan Housing & Wood Technology Center(HOWTEC)			長谷川 雅之	Masayuki Haseagwa
68	懇親会	日本	Japan	(財)日本住宅・木材技術センター	The Foundation of Japan Housing & Wood Technology Center(HOWTEC)			菊池 一徳	Kazunori kikuchi
69	懇親会	日本	Japan	(財)日本住宅・木材技術センター	The Foundation of Japan Housing & Wood Technology Center(HOWTEC)			平岡 昇	Noboru Hiraoka
70	懇親会	日本	Japan	(財)日本住宅・木材技術センター	The Foundation of Japan Housing & Wood Technology Center(HOWTEC)			飯島 敏夫	Toshio Iijima
71	懇親会	日本	Japan	(財)日本住宅・木材技術センター	The Foundation of Japan Housing & Wood Technology Center(HOWTEC)			岡田 恒	Hisashi Okada
72	懇親会	日本	Japan	(社)日本ツーバイフォー建築協会	Japan 2×4 Home Builders Association			辻村 行雄	Yukio Tujimura
73	懇親会	日本	Japan	(社)日本ツーバイフォー建築協会	Japan 2×4 Home Builders Association			芳野 裕次	Hirotsugu Houno
74	懇親会	日本	Japan	(社)日本ツーバイフォー建築協会	Japan 2×4 Home Builders Association			榎本 秀一	Syuichi Enomoto
75	懇親会	日本	Japan	(社)日本ツーバイフォー建築協会	Japan 2×4 Home Builders Association			木川 忠一	Chuichi Kikawa
76	懇親会	日本	Japan	(社)日本ツーバイフォー建築協会	Japan 2×4 Home Builders Association			島崎 光司	Kouji Shimazaki
77	懇親会	日本	Japan	(社)日本ツーバイフォー建築協会	Japan 2×4 Home Builders Association			宮下 忠彦	Tadahiko Miyashita
78	懇親会	日本	Japan	(社)日本ツーバイフォー建築協会	Japan 2×4 Home Builders Association			仮屋 茂樹	Shigeki Kariya
79	懇親会	日本	Japan	(社)日本ツーバイフォー建築協会	Japan 2×4 Home Builders Association			根岸 武	Takeshi Negishi
80	懇親会	日本	Japan	(社)日本木造住宅産業協会	Wooden Home Builders Association of Japan			中川 敏	Satoshi Nakagawa
81	懇親会	日本	Japan	(社)日本木造住宅産業協会	Wooden Home Builders Association of Japan			上田 直之	Naoyuki Ueda
82	懇親会	日本	Japan	(社)日本木造住宅産業協会	Wooden Home Builders Association of Japan			桜井 稔子	Toshiko Sakurai
83	懇親会	日本	Japan	(社)日本木造住宅産業協会	Wooden Home Builders Association of Japan			米田 誠	Makoto Maita
84	懇親会	日本	Japan	(社)日本木造住宅産業協会	Wooden Home Builders Association of Japan			小田川 光徳	Mitsunori Odagawa
85	懇親会	日本	Japan	(社)日本木造住宅産業協会	Wooden Home Builders Association of Japan			長谷川 賢司	Kenji Hasegawa
86	懇親会	日本	Japan	(社)日本木造住宅産業協会	Wooden Home Builders Association of Japan			逢坂 達男	Tatsuo Osaka
87	懇親会	日本	Japan	(社)日本木造住宅産業協会	Wooden Home Builders Association of Japan			横山 烈志	Tsuyoshi Yokoyama
88	懇親会	日本	Japan	(社)日本木造住宅産業協会	Wooden Home Builders Association of Japan			羽渕 文敏	Fumitoshi Habuti
89	懇親会	日本	Japan	日本ログハウス協会	Japan Log House Association			小坂 博美	Hiromi Kosaka
90	懇親会	日本	Japan	木構造振興(株)	Wooden Structure Promotion Co., Ltd.			岡 勝男	Katsuo Oka
91	懇親会	日本	Japan	(社)全国木材組合連合会	Japan Federation of Wood Industry Associations			細貝 一則	Kazunori Hosokai
92	事務局	日本	Japan	国土交通省	Ministry of Land, Infrastructure and Transport	木造住宅振興室	Deputy Director,Wooden Housing Promotion Office, Housing Bureau	浦口 恭直	Takanao Uraguchi
93	事務局	日本	Japan	国土交通省	Ministry of Land, Infrastructure and Transport	木造住宅振興室	Chief Official, Wooden Housing Promotion Office, Housing Bureau	天田 慎一	Shinichi Amada
94	事務局	日本	Japan	国土交通省	Ministry of Land, Infrastructure and Transport	木造住宅振興室	Wooden Housing Promotion Office, Housing Bureau	岩坂 誠浩	Nobuhiro Iwasaka
95	事務局	日本	Japan	建築・住宅国際機構	Insutitute of Intemational harmonization for Building and Housing(IIBH)	事務局長	Secretary General	西野 加奈子	Kanako Nishino
96	事務局	日本	Japan	建築・住宅国際機構	Insutitute of Intemational harmonization for Building and Housing(IIBH)				
97	事務局	日本	Japan	建築・住宅国際機構	Insutitute of Intemational harmonization for Building and Housing(IIBH)				
98	事務局	日本	Japan	建築・住宅国際機構	Insutitute of Intemational harmonization for Building and Housing(IIBH)				
99	事務局	日本	Japan	(財)日本住宅・木材技術センター	The Foundation of Japan Housing & Wood Technology Center(HOWTEC)			永田 顕聖	Kensei Nagata
100	事務局	日本	Japan	(財)日本住宅・木材技術センター	The Foundation of Japan Housing & Wood Technology Center(HOWTEC)			鈴木 圭	Kei Suzuki
101	事務局	日本	Japan	(財)日本住宅・木材技術センター	The Foundation of Japan Housing & Wood Technology Center(HOWTEC)			大澤 朋子	Tomoko Osawa

２．６　座席表

アジア木造建築フォーラム座席表

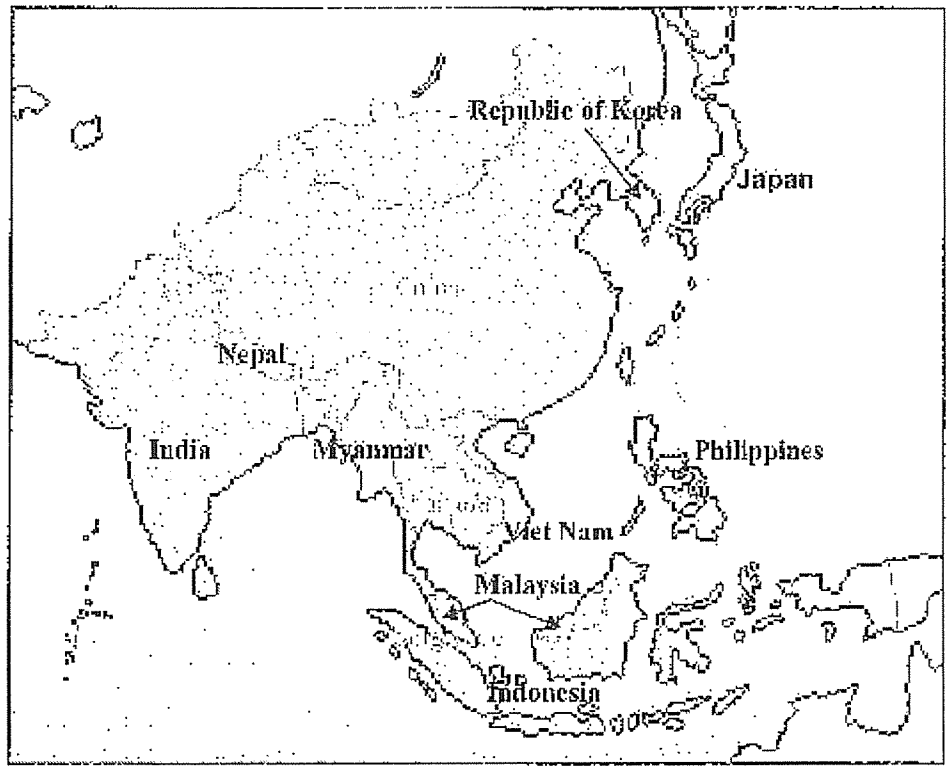
平成１９年１１月２７日（火）10:00～
三田共用会議所　３階　国際会議室



ASIAN FORUM
Wooden Architecture

ASIAN FORUM

for Wooden Architecture



November 27 and 28, 2007

Tokyo, Japan

CONTENTS

Asian Forum for Wooden Architecture

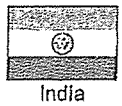
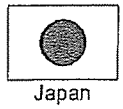
November 27, 2007
International Conference Room
Mita Kyoyo Kaigisho, Tokyo

10:00 – 10:10	Opening address	Parliamentary Secretary for Land, Infrastructure and Transport
10:05 – 10:20	Speech by a guest	Mr. Ichikawa of a league of Diet members promoting wooden housing
10:10 – 10:20	Introduction of the participants	Secretariat
10:20 – 10:45	Explanation of objectives of the forum and introduction of the agenda, such as "significance of wooden architecture" and "the use of wood as a recyclable resource"	Chair, Prof. Arima
10:45 – 11:10	"Wood-Architecture India"	India Mr. Tripathi
11:10 – 11:35	"Development and dissemination on wooden Architecture in Indonesia"	Indonesia Ir. Ismono
11:35 – 12:00	"Current State of wooden architecture and challenging issues in Malaysia"	Malaysia Ir. Mohamad Nor bin Mohd Dros
12:00 – 13:30	Lunch in Mita Room	
13:30 – 13:55	"Use of wood and traditional building construction methods in the future in consideration of preservation and restoration of historical wooden architecture"	Prof. Goto
13:55 – 14:20	"A retrospective and prospective review on Wooden Architecture in Myanmar"	Myanmar Mr. Sun Oo
14:20 – 14:45	"The Current State of wooden architecture and challenging issues in Nepal"	Nepal Prof. Kansakar
14:45 – 15:10	"Current State of wooden architecture and challenging issues in the Philippines"	Philippines Mr. Javier
15:10 – 15:35	"Community-based wooden housing in Japan: case study of housing built in Yamakoshi Village to help restoration after the Mid Niigata Prefecture Earthquake of 2004"	Prof. Miisho
15:35 – 16:05	Coffee break	
16:05 – 16:30	"Opportunities and prospects wooden architecture in Korea"	Republic of Korea Prof. Kim
16:30 – 16:55	"The Wooden structure inside Vietnamese architectural heritages"	Vietnam Mr. Nguyen Dinh Toan
16:55 – 17:20	"Current status and problems of Timber Construction Skilled Labor in Japan"	Prof. Fujisawa
17:20 – 17:30	Summary	Chair, Prof. Arima

Note: The presentation time includes a question-and-answer period.

18:00 – 19:30	Reception in Mita Room

Participants

	COUNTRY	NAME	TITLE/ORGANIZATION
Chairman	Japan	Prof. Takanori Arima	Professor Emeritus, University of Tokyo
1	 India	Mr. Shailendra Krishna Tripathi	Director Corporate Planning Housing and Urban Development Corporation Ltd. (HUDCO)
2	 Indonesia	Ir. Ismono Yahmo	Directorate for Building and Neighborhood Devt. Directorate General of Human Settlements Ministry of Public Works
3	 Malaysia	Ir. Mohamad Nor bin Mohd Dros	Director, Project Implementation and Maintenance Division, Ministry of Housing and Local Government
4	 Myanmar	Mr. Sun Oo	Secretary General Association of Myanmar Architects
5	 Nepal	Prof. Dan Heera Kansakar	Professor Department of Architecture & Urban Planning Institute of Engineering Pulchowk campus, Tribhuvan University
6	 Philippines	Mr. Joseph Alexander De Guzman Javier	President Javier Design Studio
7	 Republic of Korea	Prof. KIM, Jin-Hee	President of Korea Wood Building Design Association
8		Mr. NAM, Young-Ho	Vice President of Korea Wood Building Design Association
9		Mr. JUNG, Seung-Ho	Deputy Manager of Housing Planning Team Korea National Housing Corporation (KNHC)
10	 Viet Nam	Mr. Nguyen Dinh Toan	Chief of researching architectural history and wooden heritage projects in Vietnam Director of National Institute on Architectural Research Ministry of Construction
11		Mr. Pham Hoang Phuong	National Institute on Architectural Research Ministry of Construction
12	 Japan	Prof. Yoshikazu Fujisawa	Professor Emeritus, Shibaura Institute of Technology
13		Prof. Kiyonori Miisho	Professor Emeritus, Shibaura Institute of Technology
14		Prof. Osamu Goto	Professor, Kogakuin University

	COUNTRY	NAME	TITLE/ORGANIZATION
15		Mr. Zenjiro Kaneko	Parliamentary Secretary for Land, Infrastructure and Transport
16		Dr. Hiroto Izumi	Director-General, Housing Bureau, Ministry of Land, Infrastructure and Transport
17		Mr. Tomiyoshi Ogawa	Deputy Director-General for Building Administration, Housing Bureau, Ministry of Land, Infrastructure and Transport
18		Mr. Tsutomu Sakamoto	Director, Housing Production Division, Housing Bureau , Ministry of Land, Infrastructure and Transport
19		Mr. Koichi Koshiumi	Director, Wooden Housing Promotion Office, Housing Bureau, Ministry of Land, Infrastructure and Transport
20		Mr. Tadaaki Kobayashi	Director, Wood Industry Division, Forest Policy Planning Department, Forestry Agency
21	Japan	Dr. Yuuga Kariya	Director, Architecture and Other Structures Division, Cultural Properties Department, Agency for Cultural Affairs
22		Mr. Junichi Gouda	Deputy Director General, National Institute for Land and Infrastructure Management (NILIM)
23		Dr. Hiroyuki Yamanouchi	Chief Executive, Building Research Institute(BRI)
24		Mr. Hiroshi Sasaki	Senior executive, Member of the board, Japan Housing Finance Agency (JHF)
25		Mr. Hiroyuki Aoki	Chairman, Federation of all Japan Builders Association
26		Mr. Sumio Kishi	President, The Foundation of Japan Housing & Wood Technology Center (HOWTEC)

１．アジアにおける木造建築の持つ意味

座長　有馬　孝禮

アジアにおける木造建築のもつ意味

有馬孝禮（宮崎県木材利用技術センター所長、東京大学名誉教授）

地球温暖化防止対策、化石資源の逼迫、枯渇とそれに伴う価格高騰などを背景にバイオマス利用が大きな動きとなっている。バイオマス資源の代表である木材は大気中の二酸化炭素が太陽エネルギーの光合成によって変換された資源である。そして燃焼や生分解などによって二酸化炭素の振り出しに戻る循環する資源である。そして樹種、利用もアジア地域においてきわめて多彩である。農産物や木材は太陽エネルギーによる再生可能な、あるいは持続可能な資源（Renewable、sustainable）であるが、何より重要なことは人類自らが携わる資源生産であることである。木造建築への利用も生存に係わる生活に密接に関わっており、そこに係わる人々、波及効果の広さがある。言葉を替えれば効率だけで計れないものがある。生産の場である森林、生態系という生物生存のための共存がある。それは気候風土と環境と深く関わって、常に「空間的な連携」と「時間的な連携」を意識することにある。

1．木造建築は気候風土と地域文化を基盤としている

建築物に使用される資材は基本的にはその地域に存在する資源である。したがって木造建築に使用される木材は本来その地に育ったものが基本であり、アジアにおいても多様な木造建築物が存在しており、歴史上の文化財として多く残っている。それはそれぞれの地で育った木材の特性を生かした人々の英知が関与している。

また木材は一方では燃料となり、生産する場である森林は食料を生産する場でもあり、農地としばしば競争関係にあった。そしてその競争のために現在限られた貴重な存在となったところもある。すなわち成長量より伐採使用する量が上回ったところである。しかしながら、重要なことは化石資源、鉱物資源と異なり、植樹、育樹など管理されていれば再生可能、持続可能な資源である。また木材という資材生産に要する主たるエネルギーは太陽エネルギーである。しかもそれは生物であるが故に、その地域の気候と風土と関連が深い。それは地域の森林と人との関係から、関与する分野の広がりを意味し、生産・供給の仕組みは地域全体の独自性と利益を生むはずである。それを支えているのは人そのものである。例えば文化財の保存・補修を考えても将来に渡って資源が存在する安心こそ原点であるはずである。木造建築物で保存・補修が重要視されることは文化財の保存だけの問題ではない。

2．「消費が生産をうむ」—空間的連携と時間的連携

地球温暖化、すなわち主として化石燃料の燃焼による二酸化炭素の増加は、大半は都市の建設と運用が起こしている問題である。その二酸化炭素に関係する因子の中で木材は特異な存在である。森林・木材利用は次のようにいわれている。（1）「炭素貯蔵効果」森林における成長による二酸化炭素を吸収源し、木造建築物などで都市にストック、（2）「省エネルギー効果」他の材料と比較して著しい省エネルギー性を発揮すること、（3）「エネルギー代替効果」木材の燃焼熱の回収等も化石燃料の節約に寄与すること、といった3つの効果が期待されている。すなわち鉱物、化石資源と異なり、木材資源を使いつつ、木材資源を生産し、大気中の二酸化炭素放出削減に寄与することが期待できるところに最大の特徴がある。そこには成長、維持保存といった時間の要素が存在するので、伐採量（廃棄）が成長量より多くならないことが重要である。そのためには木材や農産物の生物資源が土地という「空間的な拡がり」である「異業種にみられる同世代との連携」、資源更新という

「時間的な拡がり」すなわち「世代間を超えた連携」の側面を併せても持っていることに留意する必要がある。

3．木造建築と居住環境―生物体としての共通性

木材は細胞を構成する木材実質とそれで取り囲まれている空隙からなる多孔性物質である。木材実質を構成する主要成分であるセルロース、ヘミセルロース、リグニンは炭素、酸素、水素からなっており、その空隙をのぞいた実質部分の密度（真比重）は1．5である。樹種ごとに異なる種々の密度は細胞が包み込んでいる空隙の大小によって軽重が決まっている。木材は他材料に比較すると著しく低密度の材料であるが、巨大な生物体、構造体をなしている。そして湿分を吸着するのは木材実質の部分であり、親水性、吸放湿特性、吸着、脱臭に関係する。空隙部は水分保持に係わり、吸水性、保水を支配する。木材実質は有機物質であるため、条件さえ整えば腐朽菌やシロアリ、微生物に犯されることになるし、空隙はそれらの生活環境を整える。このように地球上で生き抜いてきた生物体である木材は断熱と水分の吸着性、吸水などは生活環境に直接関与してストレスの緩和に寄与している。脱臭、抗菌作用などは木材の持つ精油などが関与している。

木材資源の国際価格、多様化した原料確保の中での大きな課題が急に生じつつある。いうまでもなく木造建築はその拠り所である森林・林業のもつ「環境保全」と「資源の持続性」へ最大の役割を担っている。さらに過去の経験や蓄積を基本として将来に向けて木造建築は各方面との連携や他資源との競合を通じて、人間を含めた生態系の持続に果たす役割はますます重要視されるであろう。

Significance of Wooden Architecture in Asia

Takanori Arima
Chief of Miyazaki Prefectural Wood Utilization Research Center
Professor emeritus at the University of Tokyo

There has been a growing movement to utilize biomass, in the face of global warming, a serious shortage and depletion of fossil resources, and the consequent rise in prices. A typical biomass resource is wood. It is a resource converted from carbon dioxide in the atmosphere through photosynthesis of solar energy. This circulating resource returns to carbon dioxide through combustion or biodegradation. In Asia, wood species and its uses are remarkably diverse. The most important aspect of agricultural produce and wood—renewable or sustainable resources using solar energy—is that human beings commit themselves to their production. The use of wood for architecture has direct influence on human life, affecting people involved and producing wider ripple effects on the community and various fields. In other words, efficiency is not the only measure. We need to take account of forests, which are the place for production, and of the ecological system, in which living creatures co-exist. Deeply concerned with issues of climate and environment, we must be always aware of the need for cooperation in terms of "space" and "time."

1. Wooden architecture rooted in local climate and culture

Materials used for architecture are basically resources that exist in the region. Likewise, wooden architecture basically uses wood harvested in the area. In Asia, various types of wooden architecture have been built, and many exist as historical and cultural assets. They contain wisdom of people who utilized the characteristics of wood that grew in each region.

Wood is also used as fuel, and forests are the place to produce wood and also food. Relations between forests and agricultural lands have often been competitive. For this competition, wood has become a limited resource in some areas. Those are the areas where more trees were cut down than were growing, exceeding the growth of growing-stock volume. Yet unlike fossil and mineral resources, wood can be a renewable and sustainable resource if we plant and grow trees to manage forests. Primary energy needed for producing wood is solar energy. Since wood is a living organism, it is deeply connected with local climate and natural environment. There exist relations between local forests and people, and the relations are extended to other related fields. Mechanisms of production and supply can therefore form specific features in a region and bring benefit to the whole region. We must remember that it is people who support these mechanisms. In cases of preservation and repair of cultural assets, we can carry them out with the assurance that the used materials will be available in the region in the future. The importance of preservation and repairs is not only for cultural assets but also for all architecture.

2. *Consumption resulting in production—cooperation in terms of space and time*

Global warming, or increase in carbon dioxide emissions from the combustion of fossil fuels, is largely attributed

to construction and operation of buildings in cities. Among factors related to carbon dioxide, wood is a quite unique one. There are three known effects of the use of forests and wood. The first is "carbon storage effect": growing trees act as a carbon sink that absorbs carbon dioxide, and wooden architecture continues to have this effect, thereby storing carbon in cities. The second is "energy conservation effect": wood has very high energy efficiency compared with other materials. The third is "energy substitution effect": heat generated by the combustion of wood can replace fossil fuels, thus reducing their use. The expectation to these three effects is high. Unlike mineral and fossil resources, the most significant characteristic of wood resources is that their consumption can lead to production of other wood resources, contributing to the reduction of carbon dioxide emissions in the atmosphere. We must consider this process in terms of time, such as growth, maintenance, and preservation. It is essential that the rate of logging (waste) not exceed the growth rate of growing-stock. We need to keep in mind that organic resources, such as wood and agricultural produce, have both temporal and spatial aspects. The temporal aspect includes cooperation with other fields, as seen in other industries, beyond the boundary of lands where resources are produced, while the special aspect includes cooperation with past and future generations in order to renew materials.

3. Wooden architecture and its living environment—organisms

Wood is a porous material, and consists of wood substance comprising cells and of voids surrounded by them. Main components of wood substance are cellulose, hemicellulose, and lignin. They consist of carbon, oxygen, and hydrogen. Wood substance excluding voids has a density (i.e., absolute specific gravity) of 1.5. Density varies according to species, and its weight depends on the size of voids surrounded by cells. Compared with other materials, wood has a very law density but it forms an enormous organism and structure. Wood substance is the part that absorbs moisture, and therefore related to hydrophilic nature, absorption and desorption of moisture, adsorption, and deodorization. In contrast, voids absorb water and also determine water absorption and water retention properties. Since wood substance is an organic material, it is subject to degradation in specific conditions by termites, wood-rotting fungi, and microbes. Voids may create conditions suitable for them. Wood is a living organism that has long survived on the earth, and its effects, such as heat insulation and water adsorption and absorption, can directly influence our living environment, leading to ease our stress. Essential oil of wood has deodorization and antibacterial effects.

In view of international prices of wood and securement of diversified materials, critical issues are rapidly emerging. Wooden architecture plays a key role in "environmental conservation" and "sustainability of resources," the issues that forest and forestry are facing. Furthermore, the role of wooden architecture in sustaining the ecological system that includes human beings will assume greater importance. It will be played on the basis of past experience and growing-stock of forests through cooperation with various fields and competition with other resources.

2. Wood-Architecture India

Mr. S K Tripathi

Wood-Architecture

India

Presented By
S.K.TRIPATHI
Director Corporate Planning

Housing and Urban Development Corporation Ltd.
A Government of India Undertaking

November 2007

INTRODUCTION

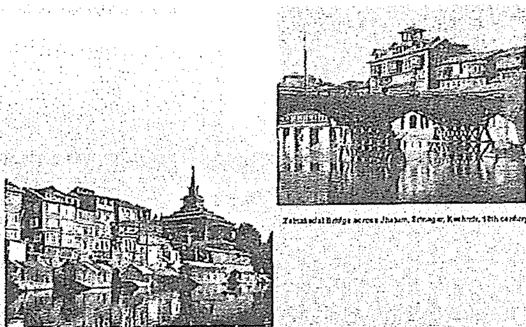
Historical
India had a diverse range of timber buildings. Some of them are still existing.

Usage of wood in construction started during the early days of humanity.

Current
Products and applications of timber and timber products in Urban areas are very different from that in Rural areas.
Timber or timber products are not used in infrastructure projects.

Future
Timber being a renewable resource has a definite advantage, only when Long-term Environmental and Economical sustainability is given due importance.

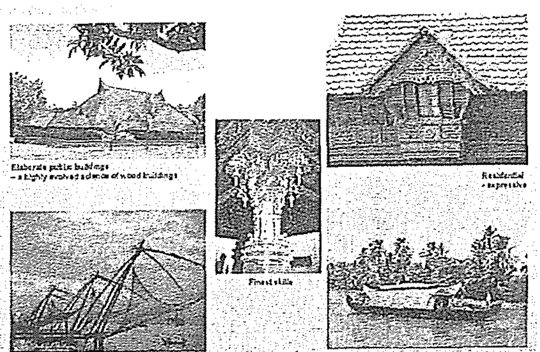
TRADITION



Zaina kadal Bridge across Jhelum, Srinagar, Kashmir, 18th century

Khanqah Shah Hamadan Mosque in Srinagar, Kashmir, 18th century

TRADITION



Elaborate public buildings
– a highly evolved science of wood buildings

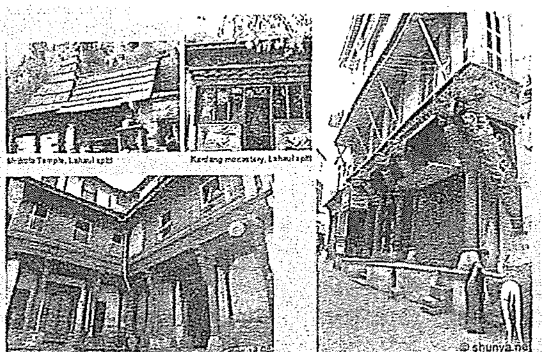
Finest skills

Residential
– expressive

Fishing nets and jetties

Boat Locus

TRADITION



Temple, Lahaul spiti

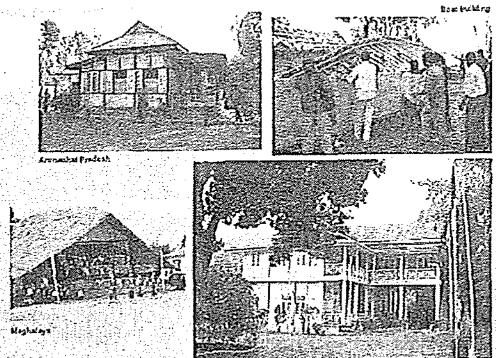
Kardang monastery, Lahaul spiti

Old City, Ahmedabad

Old City, Ahmedabad

TRADITION

Boat building

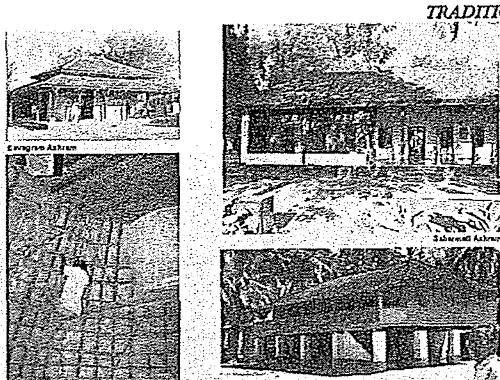


Arunachal Pradesh

Meghalaya

Assam

TRADITION



Sevagram Ashram

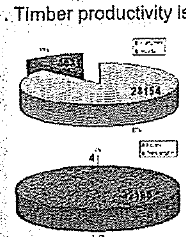
Sabarmati Ashram

Interior of Nicobari Hut

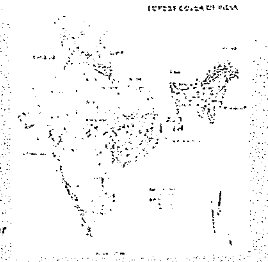
Nicobar Island

CURRENT STATUS
Wood

Resources
. India has 22% of forest cover, 0.1 Ha per capita. (0.6 Ha in World)
. Tree cover outside forests 2.5%
. Timber productivity is 0.7cum/ha/year. (2.7 cum/ha/year world)



Production, Trade and Consumption of All Timber
In 1000 cum.

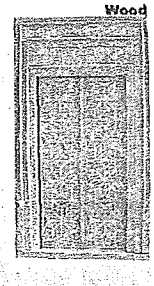


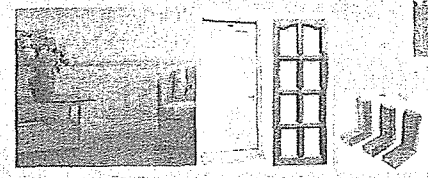
CURRENT STATUS
Wood

Urban Uses

Mostly non-structural use.

- Doors / Windows
- Ornamentation
- Furniture
- Flooring
- Partitions / Panelling



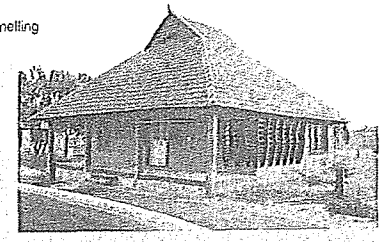


CURRENT STATUS
Wood

Rural Uses

Structural and non-structural use.

- Roof
- Wall
- Doors / Windows
- Furniture
- Flooring
- Partitions / Panelling

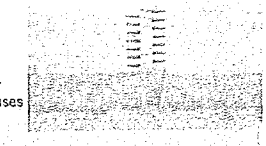


CURRENT STATUS
Timber products

- Board
- Ply
- Veneer
- Partitions
- Furniture

CURRENT STATUS
Innovative Timber products

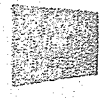
- Engineered wood
- Finger jointed wood, boards using plantation timber
- Glued Laminated (GLULAM) Timber for structural and non-structural uses
- Laminated veneer lumber
- Flexiply (bamboo mat sandwiched between wood veneers)
- Veneer tenderizing
- Sawing techniques for small diameter logs, modifications to small and medium sized saw mills, which constitute 95% of all saw mills in India.
- Sawing method for hollow timber, like palm.

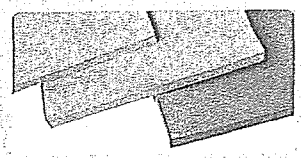


CURRENT STATUS
Timber substitutes

Boards

- Coir / Jute board
- Cement bonded fibre board
- Rice husk board (from agricultural waste)
- Boards from fibers of lignocellulosic material felted together (coir, jute, rice husk, sisal, bagasse, banana, bamboo, pine needle, cotton stalks etc.)
- Medium Density and High Density Fibre Board
- Particle Board





CURRENT STATUS
Timber substitutes

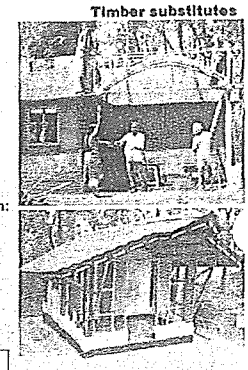
Bamboo

- Sustainable
- Renewable
- Environmental friendly
- Low energy consumption
- High strength to weight ratio
- Fast growing
- Widely available
- Suitable for agro forestry / rehabilitation of denuded / shifting cultivated lands.
- Many species suitable for construction applications.

Commonly used species in construction:

About 50% of the total Bamboo resource of India is accounted for by the North Eastern Region.

Bambusa balcooa
•Bambusa bambos
•Bambusa tulda
•Dendrocalamus giganteous
•Dendrocalamus hamiltonii
•Dendrocalamus asper, etc



CURRENT STATUS
Timber substitutes

Bamboo

BAMBOO IN THE HOUSING SECTOR IN THE NORTH EASTERN REGION : THE PRESENT SCENARIO

Introduction :

1. Bamboo has been used from time immemorial for construction of houses in N-E Region.
2. Bamboo is found in abundance in the Region and has been used both as a structural and non-structural member in the construction of houses.
3. Simple traditional tools like the "DA" or "DAO" are used. While most of the Bamboo is available in the forest,
4. Bamboo grooves (BAHANI) is found in the backyard of every household, particularly in the rural areas in the region & meets the captive demand of the Household.
5. Traditional methods of preservation of bamboo are used and the local artisans and the villagers are well conversant in the know-how of construction using bamboo.

State	Bamboo Growing Area (Sq. Km.)	Bamboo Growing Stock (Million tones)
Mizoram	9246	10.89
Assam	8113	13.41
Arunachal Pradesh	4590	9.84
Manipur	3972	11.47
Meghalaya	3128	4.41
Tripura	633	0.85
Nagaland	758	0.65
Total	30584	54.84

** Bamboo Resource in N.E. Region

A existing Un-th Rural Assam with mud plaster and CGI sheet roofing

CURRENT STATUS
Timber substitutes

Bamboo

Housing Stock in the Region

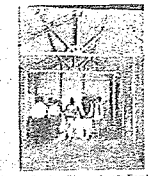
Typical housing stock of the Region

(i) Rural areas :

(i) All bamboo house (bamboo as a structural member)
•Bamboo post-columns,
•Purlin-rafter,
•Bamboo mat/split bamboo walling with mud plaster,
•Thatch/reed/bamboo mat-shingles roofing,
•Bamboo mat door and shutter,
•mud flooring etc.

(ii) Semi Rural / Semi Urban Areas :

Bamboo – Timber – Brick Composite house (Bamboo used as non-structural member)
Wooden / Brick post, brick/ slit bamboo Walling with cement plaster,
CGI sheet roofing,
Bamboo mat ceiling,
Wooden door/window shutters,
Mud / brick flooring etc



An "all Bamboo House " with Bamboo column and Bamboo mat walling, Bamboo roof truss and roofing

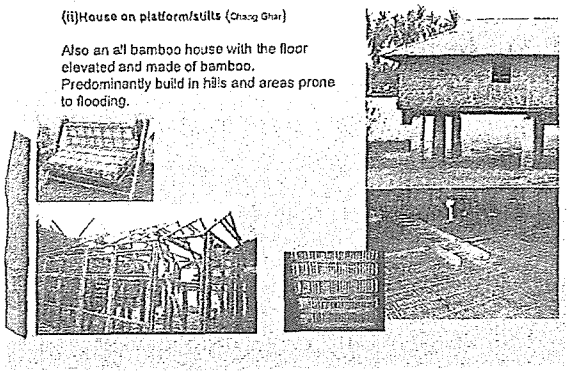
A existing Un-th Rural Tripura with Bamboo mat wall and CGI sheet roofing

CURRENT STATUS
Timber substitutes

Bamboo

(ii)House on platform/stilts (Chang Ghar)

Also an all bamboo house with the floor elevated and made of bamboo. Predominantly build in hills and areas prone to flooding.

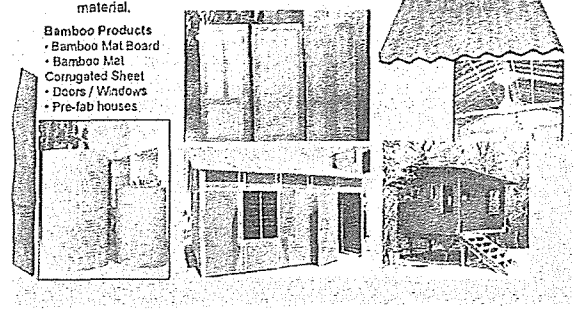


CURRENT STATUS
Timber substitutes

Bamboo

(iii)Urban Areas :
Bamboo is used mostly for scaffolding and props for shuttering works etc.
Bonded bamboo mats are used for partitions, false ceilings and wall cladding material.

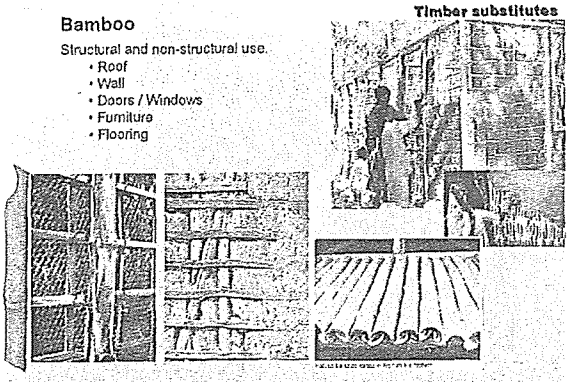
Bamboo Products
- Bamboo Mat Board
- Bamboo Mat Corrugated Sheet
- Doors / Windows
- Pre-fab houses



CURRENT STATUS
Timber substitutes

Bamboo

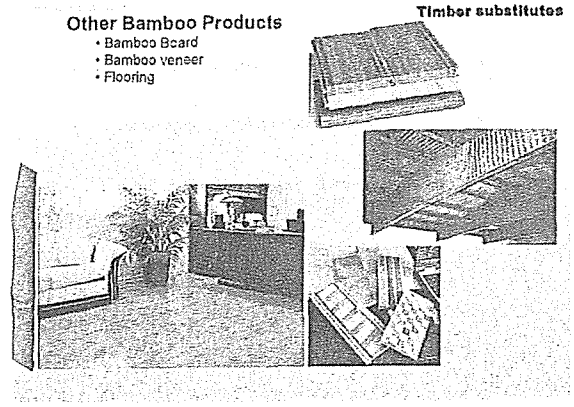
Structural and non-structural use.
- Roof
- Wall
- Doors / Windows
- Furniture
- Flooring



CURRENT STATUS
Timber substitutes

Other Bamboo Products

- Bamboo Board
- Bamboo veneer
- Flooring



CURRENT STATUS
Timber substitutes

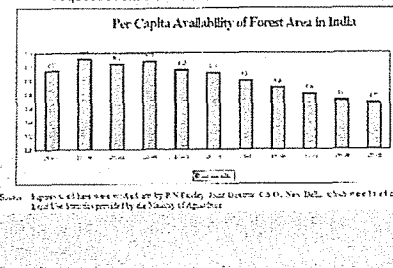
Bamboo

- Indian Standards

IS 1902:1993	Code of Practice for preservation of bamboo and cane for non-structural purposes
IS 6874:1973	Methods of test for round bamboos
IS7344:1974	Specification for bamboo tent bamboos
IS 8242:1976	Methods of tests for split bamboos
IS 9096: 1979	Code of practice for preservation of bamboo for structural purposes.
IS 13958: 1994	Specification for bamboo mat board for general purposes
IS 14588: 1999	Specification for bamboo mat veneer composites for general purposes
IS-15476: 2004	Bamboo mat corrugated sheets
IS 5913:	Durability including water absorption, impermeability, load bearing capacity, density, frost cracking etc.
IS 4908: 1968	Random sampling.
IS 456: 1992	Standard for accelerated aging.
UV Resistance test	Lamp UV-B Cycle: 4 hours exposure at 60°C followed by 4 hrs humidity exposure at 50°C.
IS 4990: 1993	Ply wood for concrete shuttering.
ISO 22156: 2004	Bamboo structural design
ISO 22157: 2004	Bamboo physical and mechanical properties.

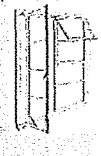
CURRENT STATUS
Concerns

- **Damaging impact on the environment** as a result of excessive pressure on forests and non-forest tree cover due to a large gap between productivity and demand. Urgency of plant based carbon sequestration.



CURRENT STATUS
Concerns

- **Inappropriate efforts in substitution** of wood using high energy materials such as metals or environmentally damaging materials such as plastics.
  - Wood is renewable
  - Wood is biodegradable
  - Wood – Low embodied energy in production and low energy on transportation and maintenance (except when synthetic preservatives or paints are used)
    - Steel – very high embodied energy
    - Steel – very high energy requirement in transport and maintenance.
    - Plastic – non biodegradable
    - Plastic – emits toxins such as phthalates



CURRENT STATUS
Concerns

- **Inadequate technology transfer** to reach the benefits of research and development to the basic users, both in rural and urban scenarios.
  - Limited institutional infrastructure (only Building Centres and some NGOs with limited reach in rural areas)
  - Lack of comprehensive programmes to disseminate research and development information

CURRENT STATUS
Concerns

- **Deteriorating traditional knowledge** and traditional skills as a result of lack of efforts in adaptation of traditional knowledge to the changed scenario in market and culture.
  - Documentation of skills, tools, techniques
  - Documentation of traditional knowledge on species, treatments, joinery, structural calculations, geometry derivations
  - Efforts on adaptation of traditional knowledge

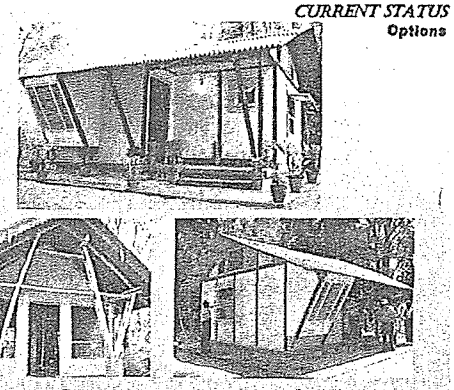
CURRENT STATUS
Concerns

- **Complete absence of curricula** relating to application of timber or timber substitutes in education of architecture / structural engineering / construction engineering.
  - Development of curricula and training material to suit all the concerns required
  - Quality Improvement Programmes for faculty

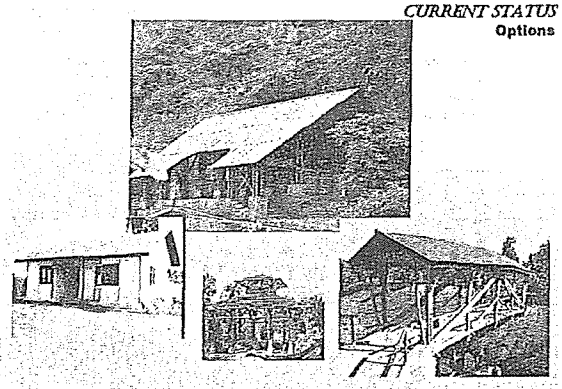
CURRENT STATUS
Sustainability

- **Rationalising** the utilisation of available wood resources through appropriate technological intervention.
- **Development of wood alternatives** from other natural / renewable fibres.
- **Policy interventions** for formulation and implementation of sustainable timber management policies.
- **Sustainable farming** methods for bamboo, plantation timber, fibre crops etc.

CURRENT STATUS
Options



CURRENT STATUS
Options



CURRENT STATUS
Research & Development

Organisations

- IPIRTI – Indian Plywood Industries Research and Training Institute
- BMTPC – Building Materials and Technology Promotion Council
- CBRI – Central Building Research Institute.
- FRIs – Forest Research Institutes
- NMBA – National Mission on Bamboo Applications
- INBAR – International Network for Bamboo and Rattan
- NRFBT – National Resource Facility for Bamboo Technology
- CBTC – Cane & Bamboo Technology Centre
- IITs – Indian Institute of Technology
- HUDCO – Housing and Urban Development Corporation Limited
- NGOs – Non-Governmental Organisations

CURRENT STATUS
Conclusion

Thank you

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CURRENT STATUS
Synopses

WOOD Architecture
Current state of wood architecture

	Historic (before the advent of steel and RCC)	Current	Sustainable
Urban	Timber was used for structural and non-structural elements in buildings	Very rarely, due to high price, low quality and environmental concerns. Processed timber products such as boards, panels are preferred	Treated secondary species, fast growing varieties, bamboo etc. Wood substitute products making very efficient use of renewable resources
Rural	Timber was used for structural and non-structural elements in buildings	Mostly raw timber is still being used, depending on availability of timber locally. Processed timber products are not used due to higher cost.	Technology transfer for efficient use of renewable resources with rural technology.
Infrastructure	Bridges, railway sleepers, foundation piles, river training structures etc.	none	

Current state of research
Thrust is on substitutes which are cheaper, easier to work with, possess good aesthetic and engineering properties, do not possess the disadvantages common with timber (susceptibility to attack of pests, twisting, warping, shrinking, etc.), environment friendly etc. They include particle boards, treated plantation / secondary species timber, bamboo, bamboo boards, mat boards, fibre boards, gypsum boards, etc.
Current state of engineers and specialist
It is almost entirely absent at the level of academic curricula. Low demand due to low usage of timber. Some efforts are being made to popularise the use of treated timber and bamboo.
Challenging Issues
Environmental issues, depleting forest cover and resulting imbalance which call for a strict timber resource management policy and modes and means of implementing it seems to be the biggest challenge.

3. Development and Disseminaition on Wooden Architecture Indonesia

Ir. Yahmo Ismono

Development and dissemination on Wooden Architecture in Indonesia
インドネシアにおける木造建築の発展と伝承

Wooden architecture in Indonesia are notably executed on various range of buildings/ dwellings which indicated as the group representation; the traditional architecture buildings; the local ingenious buildings especially found in area with abundant resources on timber and in the countryside; temporary and semi-permanent buildings built by the low-income people; and the newly built / contemporary buildings designed for special purpose, such as: creating traditional ambiance, mainly reflecting the local / tropical architecture.
In sequence with achieving the building safety requirements and giving out the buildings architectural identity while leveling with the scarcity of timber supplies as the main feature of wooden architecture, The Government, had already issued regulations, standards, and technical guidelines concerning the use of wood as construction materials; experts and community supports the values and norms of wooden building
My paper illustrates: current state of wooden architecture in Indonesia; trend and challenging issues concerning the development of wooden architecture; and also Endeavour by government to regulate wooden architecture dealing with design, construction, and maintenance, including development and dissemination to all parties involved.

インドネシアの木造建築は、集団のアイデンティティを顕著に表すものである。それは古くからの伝統を示し、また地方では、そこに木材資源が豊富にあることを示す。ときには低所得者の仮住まいとなり、一方では南国風の雰囲気を演出するための一時的な施設にもなる。
建物の安全性に対する要求を達成するため、建築物のアイデンティティを表すため、また、木材供給不足の対策として、政府は木材を建築物に使用する際の法律や標準、技術基準を示している。今は専門家も市民も木造建築の価値と可能性を支持している。
私の発表では、インドネシアにおける木造建築について、その現状、傾向と課題、設計・施工・管理の標準化推進とその普及ための政府努力を紹介する。

Title : **CURRENT STATE OF WOODEN ARCHITECTURE IN INDONESIA**

Sub Title : **Development and dissemination on Wooden Architecture In Indonesia**

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1. BACKGROUND

Wooden Architecture have been widely known for a long time in Indonesia, due to several likely reasons such as geographical condition, tropical climate, abundant forestry resources, and supporting local culture, for Indonesian society to build buildings and houses by using wood as main materials, each in own distinct local culture and tradition.

In practice, wooden architecture considerably can still be seen on various buildings or housing groups which is notably recognized in the following groups:

a. Traditional buildings, includes the ancient historical/ heritage building such as Keraton / Palaces. These old buildings spread out from eastern to the western part of Indonesia, and more than hundreds of them found in 468 town/cities, for example: Aceh, Minangkabau, Malay, Sunda, Java, Bali, Lombok, Kalimantan (Borneo), Toraja, Bugis, Papua, etc.

b. Timber buildings located in certain geographical, such as; tideland area, mountain area, rural area, and timber producing area, uses wood as main material either as construction or as finishing materials.

c. Semi permanent and temporary shelter, most of them built by the low income people, such as found in slum dwellings, river banks, railroad bank, and in the rural area.

d. Dwellings or simple building block, which due to the local customary culture, is still attracted and fanatic on the use of woods as the building's main fabric, and

e. New contemporary building which were design to achieve special purpose, such as: creating traditional ambiance, or imitating of old buildings, and building to reflect the Indonesian tropical architecture, such as government buildings, hotels, showrooms/ exhibition halls, commercial buildings, restaurants, even homes.

In this excerpt, the discussion will be emphasized more on the government effort to implement wooden architecture norms on traditional (architecture) buildings and the newly built construction which accommodate the demand of creating traditional ambiance, especially relate to the building requirements and reliability, and to disseminate the norm/ regulation to the stakeholder, nation wide.

2. ISSUES

Considerably, the government concerns were still not at present on undertaking wooden architecture in systematically, this issue linked to the trainings, regulation of timber /wood trading, the fabric standardization and construction, preservation, building inventory, and also the associated parties involved in wooden architecture such as universities, professional association, specialist, and industrialist with less significant supports.

Nowadays, we have no accurate data on the total number of the wooden building, i.e; type of building, condition, etc, due to the lack of survey and record attempt on built-buildings thoroughly.

3. PROBLEMS

In general, there are many challenging issues concerning future development and promotion of wooden architecture in Indonesia, such as:

a. Scarcity of timber

Totally, forest area in Indonesia decreased periodically caused by legal or illegal logging. Approximately, 80% of available timbers are not categorized as a good construction material. Although each year annually, timber construction, (for housing necessity only), requires 2.4 million m3 or in equivalent with 100.000 ha of forest wood. Assuming 700.000 hoses will be built each year, estimated each house would acquire 3.46 m3 of timber.

Indonesia is however dealt against the serious timber scarcity problems which relate to the forest decrease, moreover, the upcoming issue on global warming stated that, Indonesia must preserve its forest and keep it in function as one of the world's lungs, which also meant stop the timber logging.

b. Scarcity of Traditional Buildings

In coherent with the culture and architecture development in the West, which considerably creating great impact, especially affecting the culture changes, paradigm, habits, practicality and efficient point of views, and also triggered by the social and economical conditions, for some of the Indonesian community have less interest on traditional buildings. The condition were caused by the complexity and varied activities emerged requiring spaces / newer built buildings, since, the existing traditional building could not accommodate these emerging needs, due to it's costly expense and limitation on timber-material availability.

For the existing buildings, maintenance and preservation issue can be one identify as one of the factor causing the decrease of traditional buildings numbers, whilst the experts /

carpenter specialist on traditional buildings also triggered the decrease of the newly-built traditional buildings.

c. The bad image.

For some society, wooden building gives the negative impression of temporary shelter or a semi permanent construction, and most probably used by the low income people. This impression cause on the trend of rural communities to replace their wooden building to concrete structure. For them, the new concrete building look good and similar to other building in big cities (give the urbanized impression), which sometimes would differ its geographical and habitual fitting.

d. Construction and maintenance of the building

Currently, timber price have increased largely in Indonesia, especially timber-construction material with standardized strength and certain preserved scale, for example; an export quality teak wood would reach US$ 2.500 / m3 in price, while the Borneo-wood would reach about US$ 700 / m3.

Moreover, considering to the high rainfall, humidity, high temperature average in Indonesia, caused the existing flora such as mold, and fauna such as termite, bees, and other wood-hampering fauna, causing the building maintenance and preservation expensive, especially for wooden building with many intricate details and ornaments.

e. Timber industry

Not so many people are interested in developing and creating wood base industry, which include sorting, preserving, and strengthening timber material in an innovative way, especially in the line of alternative construction-wood provision.

f. Limited application in new building construction

Conventional wood/timber possess its limitation usage mainly when it is applied for more than 2 stories building, which in turn would be problematic for the newer built, therefore, a breakthrough is required in supplying more innovative construction wood.

g. Limited of expertise on wooden specialist

Wooden building require expertise either by engineers, nor a competent specialist in term of safety (earthquake, structure, durability, fire resistance and termite) and performance/aesthetically and also philosophically specific to the traditional architecture, which conceptually differ from one building to another, from one region compare with other region. For example, in Balinese traditional architecture, it is notably known of the *undagi,* whilst in Batak traditional architecture it is known as *gorga*, and in Toraja it is known as *pande*. Unfortunately, there have not yet been any existing data pointing the exact number, spread, and the existing association of these specialist groups.

There are some researcher specialist who studies in traditional buildings, carpenter who

is expert in traditional wooden architecture, and lecturer in some universities, also in Ministry of Public Works and Ministry of Forestry. There is no special association in wooden architecture, nevertheless there are groups in some associations such as: architect, engineers etc who are concern with wooden architecture.

h. Safety (from fire)

Wood is vulnerable to fire. Accounting the fire rate number in Indonesia is high in average especially in the high density area and in predominant with wooden-built buildings.

Some of the heritage buildings or traditional buildings and the surrounding neighborhood, particularly the preserved ones are likely exposed to fire, which in this case would require effort on outfitting the kit and tools for evading fire.

4. EFFORT

Facing on problems, effort on preserving and even further on developing wooden architecture in Indonesia, these various steps are taken inti account which can be describes as follows:

a. Government Policy

In lieu of meeting safety requirements and giving out the building's architectural identity, and in parallel sustaining the timber-constrcution supply as one of wooden architecture's amin fabric, The Government had ratify several legal Act, Standards and Technical gudance n the usage of wood/timber as construction materials; whilst experts and society reders the norm and values on wooden-built buildings.

Further on, in the field of building and construction, Building Law No.28 / 2002 had been enacted, which comprises following act:

1) The building's architectural requirement, identified by the local neighborhood and surrounding fitness, include the implementation of the architecture characteristic rendering it's identity.
2) The importance of building registration in achieving order in building development and utilization including the management information system (MIS)
3) The safety regulation requirements on bildings, especially for the structural ability in against strain and pressure including earthquake, efforts in fire prevention and resistance, also against lightning threat and the closely related electrical installation system
4) Preservation of protected building in accordance with National Law No.5 / 1992 on Cultural Preservation Site.

5) National guidance campaign, together along with the local government, professional association, and society conncerned with Buildings, includes dissemination for all stakeholders.

Thus, the central and local government working alonside with the expert society, and Universities formulating technical gudelines and standards correlate with buildings specifically wooden-built, such as " Design Procedure for Timber Construction in Indonesia", Ministry Regulation on Preservation, lumberwood utilization in general and and also managing timber construction usage. The effort also

b. Expertise Supports

Several research on construction wood have already been done to support government programs, such as: preservation, strengthening, utilization of fast-growing trees in sustaining the supplies of construction wood. Regarding the issue, Directorate General of Housing adn Settlements in bandung have already retain a completed study which evidently ready and available, yet the costly budget suspend it's implementation

c. Development

According to the Building Law, Government shall give nation wide direction/guidance on building construction, and provincial government shall implement the direction together with community associated with the buildings construction (experts' society, professionals association, company association, building owners and users, local government apparatus) to the people.

The guidance consists of regulation arrangement, empowerment, and supervision activities, so every building construction can be carried out orderly, reliability in accordance with the function, and the legal certainty can be realized.

In terms of wooden architecture, government regulates the development as follows:

1) Government Buildings in local region, should adapt the local distinct architecture in gaining its local identity, and preservation.
2) Cities/town should have Teams of Building Experts which were assigned to conduct checking and supervising building reliability standard requirement and the building fit with its local architectural fitting with its local surroundings neighborhood.
3) Cities/towns should conduct building registration and manage the information system which include wooden architecture and preserved buildings.
4) Regulation on administrative and technical requirement for traditional buildings, semi permanent and temporary buildings, and the building constructed on disastrous area shall be determined by local government in conformity with the local social and cultural condition.

5) Traditional Architecture Inventory by some local governments in cooperation with university and architect, conducting seminar and technical discussion
6) Cooperation with expert and institution in order to get a new standard and technology on wood construction.

d. Dissemination

Government through the Ministry of Public Works cq. DGHS, Directorate of Building and Neighborhood Developmenet each carry out series of dissemination on regulation, such as:

1) Law, in relation with Public Works agenda
2) Government Regulation
3) Technical Guidelines and standards
4) Lates Issues, eg: wood construction, MDG, global warming, poverty alleviation, illegal logging, etc.

Hence, the program target reached local government, in Provincial level/ cities/ towns, Universities, professional associations, and private association, and also, society in general.

Nevertheless, in considerate with the government limiation in providing time, resources, and budget availability, some part of the dissemination itself was delegated to the local government and the team of experts, hopefully the effort will reach further and wider impact.

Alongside, effective means on dissemanating rules and regulation should be developed in achieving better information transfer, these effort consist the following example: creating commmunication forum and information, seminars, workshops, technical discussion, and also established Building Information Center completed with the website network.

5. REMARKS

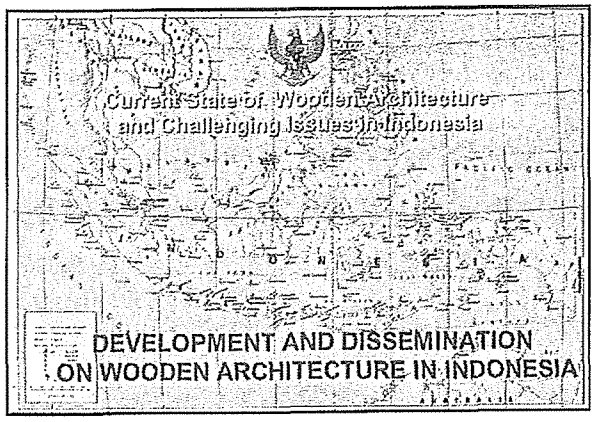
Finally, I sincerely hope that this paper would provide a contextual framework (Development and Dissemination) which wooden architecture development can be addressed and discussed in this one day session and the result of this conference would provide a positive and useful contribution to our effort in achieving **sustainable wooden architecture.**

Through this Asia Forum, in improving teamwork among Asian countries it is necessary to do the following;

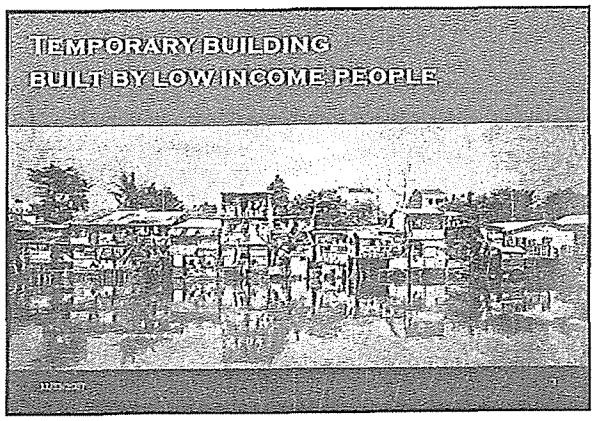
1. To promote cooperation among member in handling wooden architecture development problems, such as **establishing National Policy, encouraging wood construction industry and research centre, cooperation among parties relate to,**

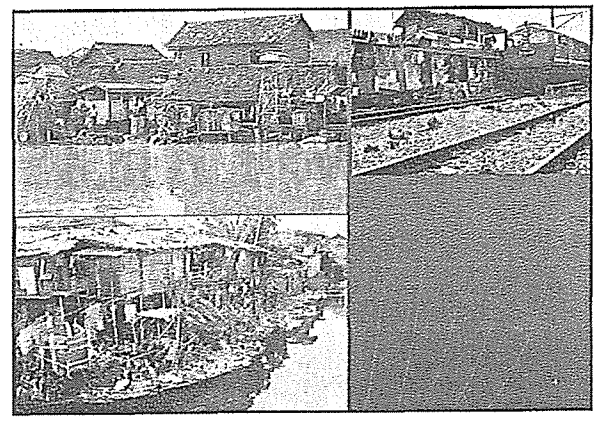
traditional building preservation, incentive /disincentive system, networking and information system, etc.

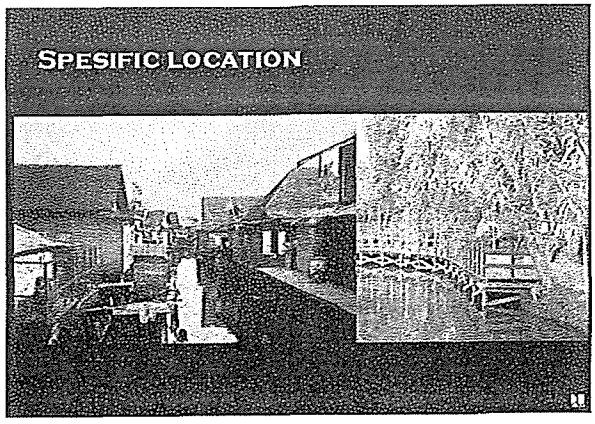
2. To exchange some ideas and best practices in the wooden architecture development, in order to set up **potential technical cooperation among countries.**

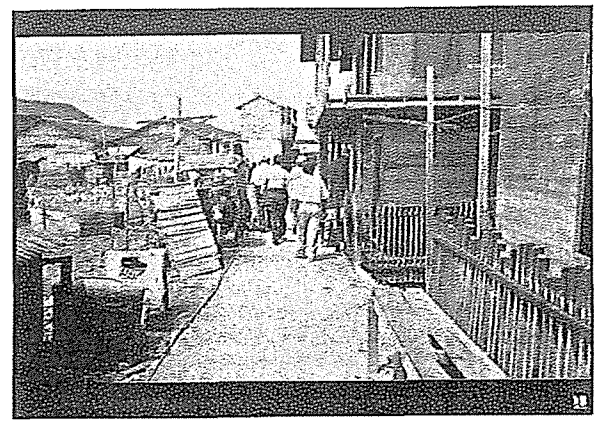

Current State of Wooden Architecture
and Challenging Issues in Indonesia
DEVELOPMENT AND DISSEMINATION
ON WOODEN ARCHITECTURE IN INDONESIA

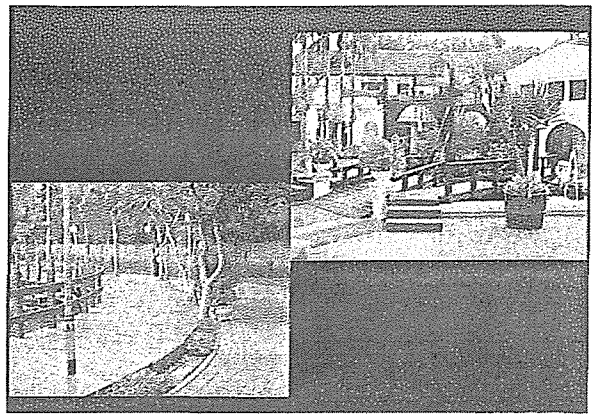

WOODEN ARCHITECTURE
in INDONESIA

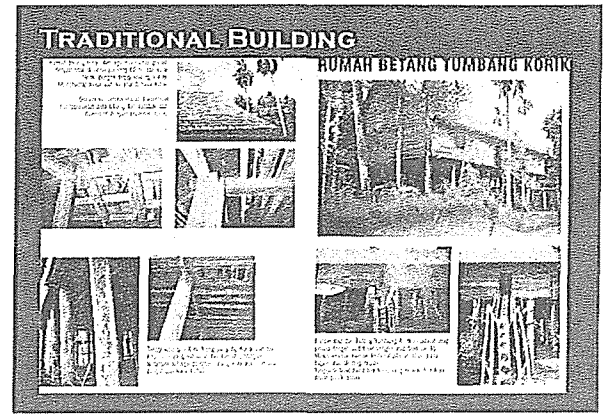

TEMPORARY BUILDING
BUILT BY LOW INCOME PEOPLE

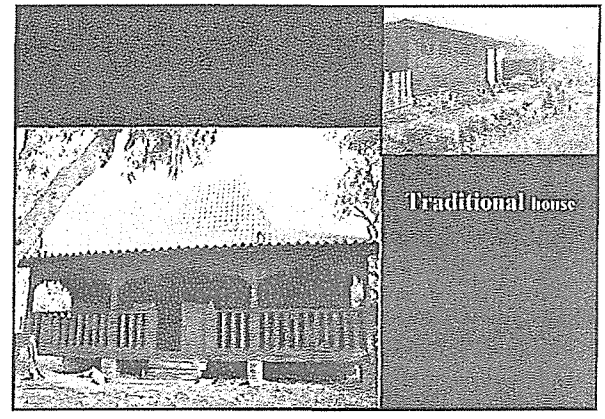


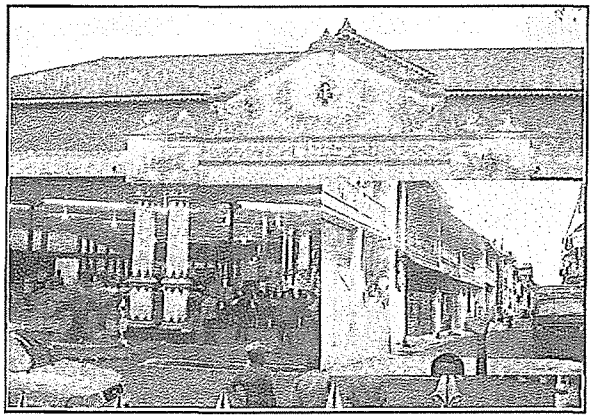

SPESIFIC LOCATION

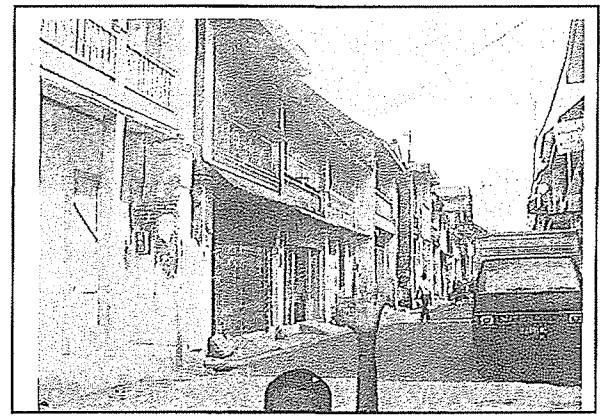


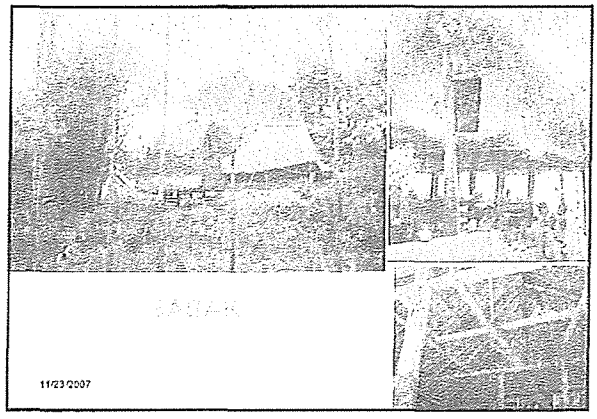



TRADITIONAL BUILDING
RUMAH BETANG TUMBANG KORIK


Traditional house



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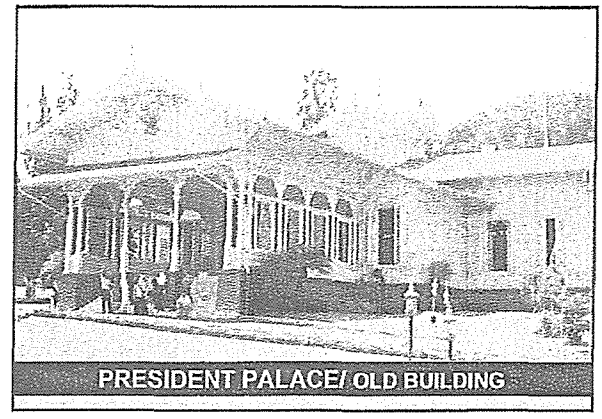
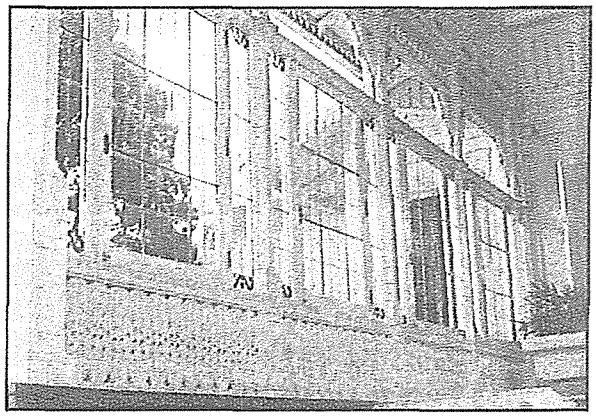
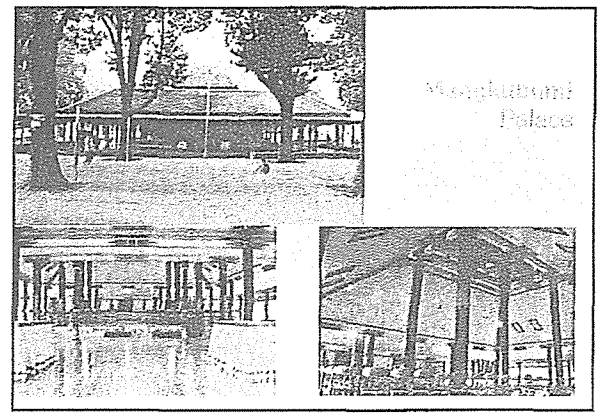
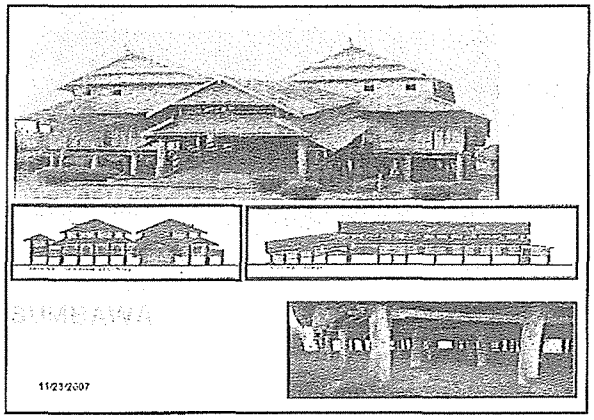

PRESIDENT PALACE/ OLD BUILDING




Palace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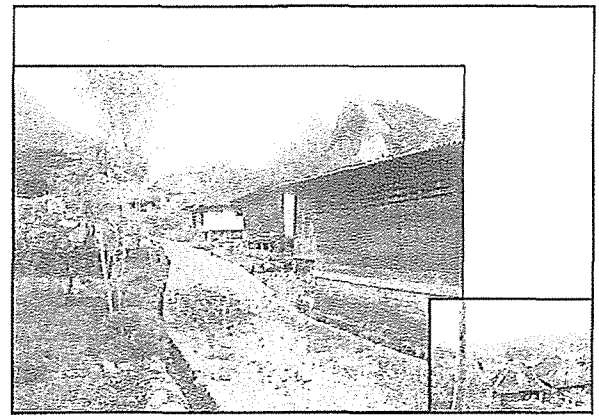

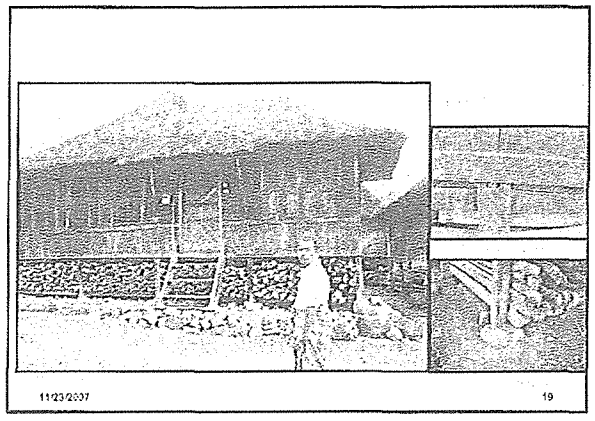
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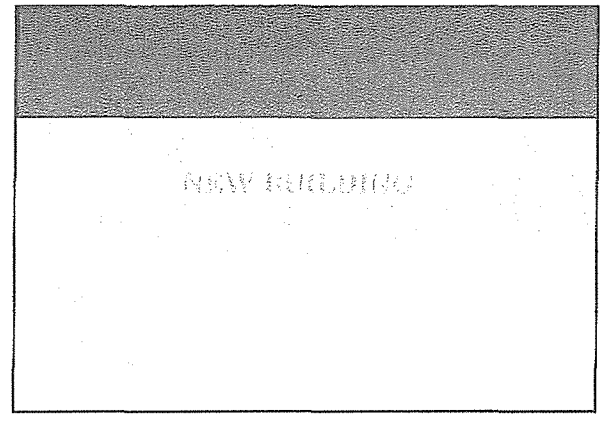

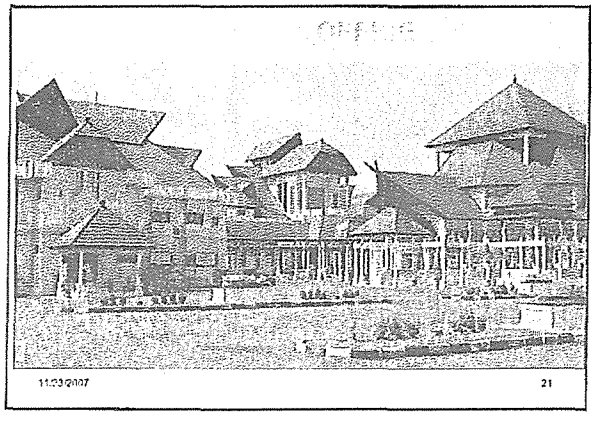
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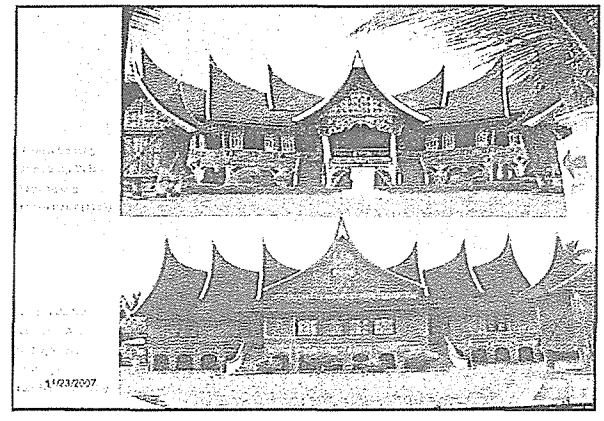
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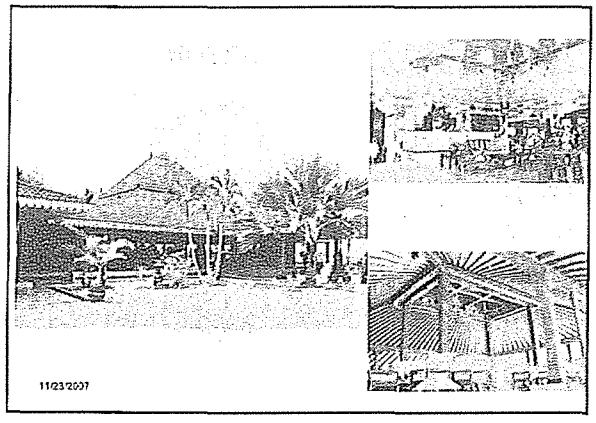
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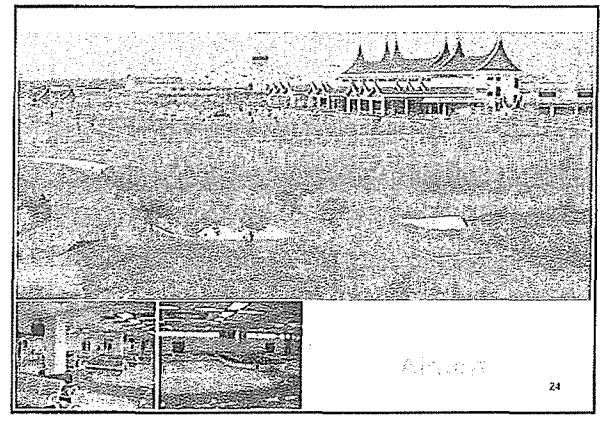
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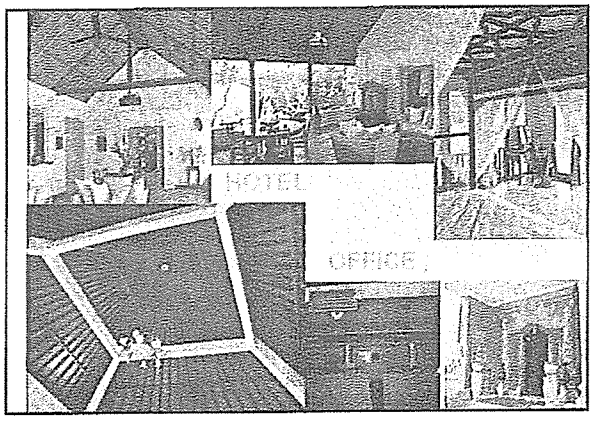
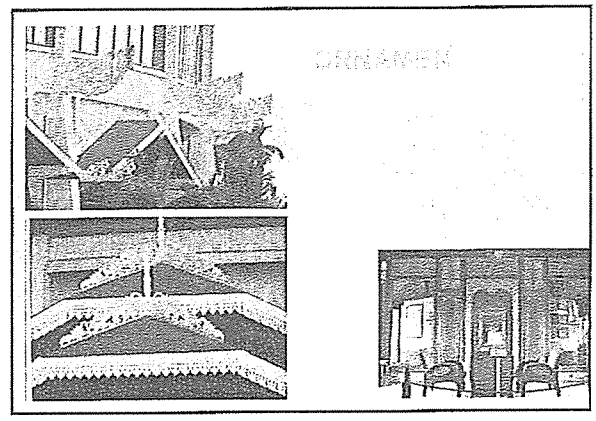
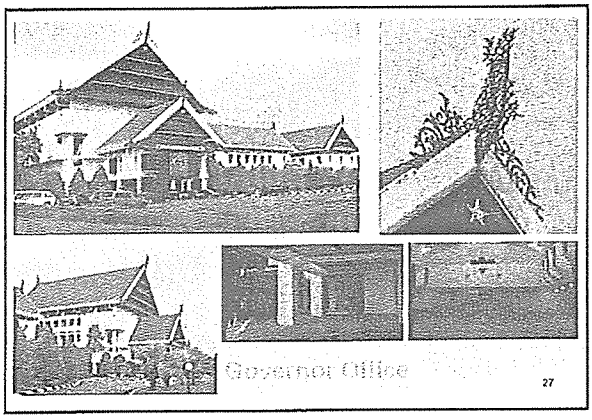
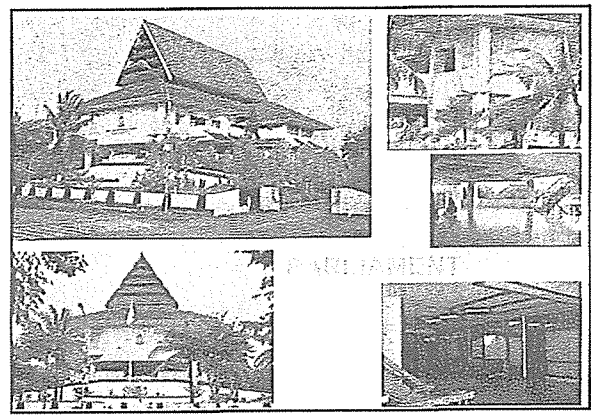
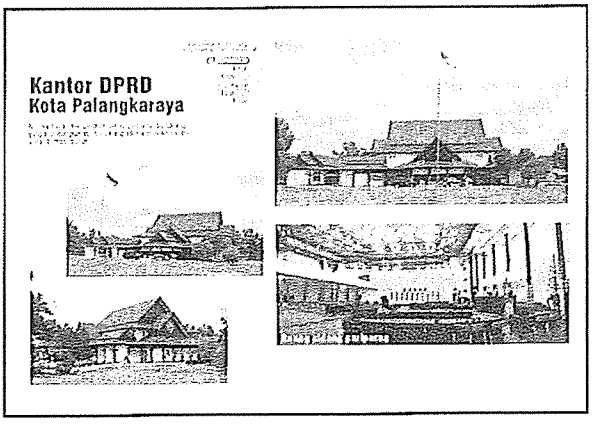
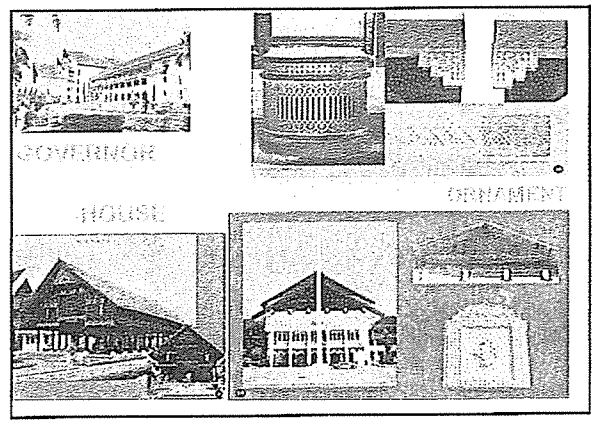

HOTEL
OFFICE

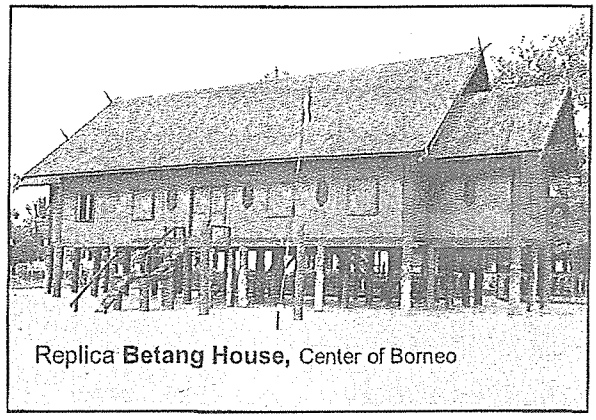

GARAGE


Governor Office
27

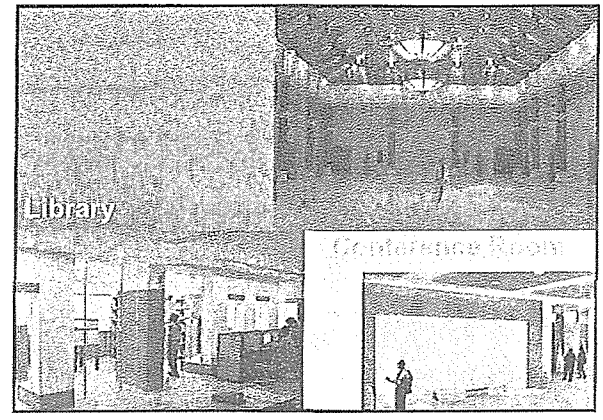

PARLIAMENT

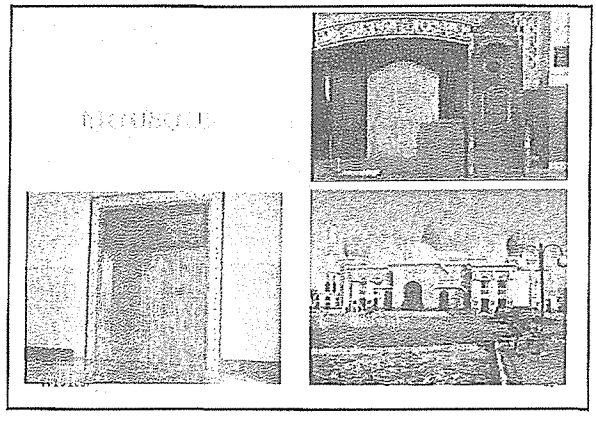

Kantor DPRD
Kota Palangkaraya


GOVERNMENT
HOUSE
ORNAMENT

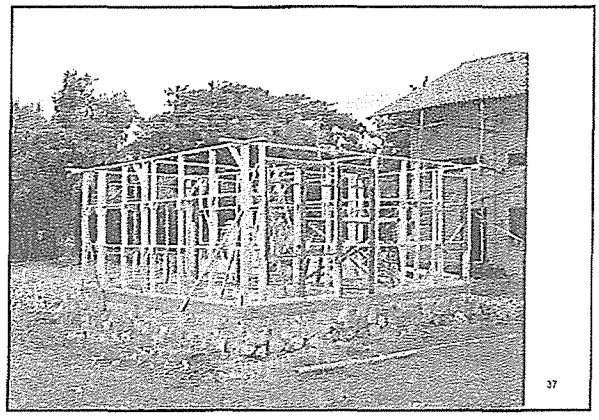


Replica **Betang House,** Center of Borneo





POST EARTQUAKE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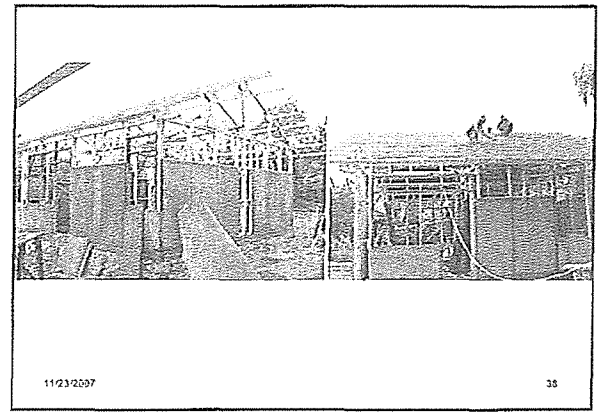
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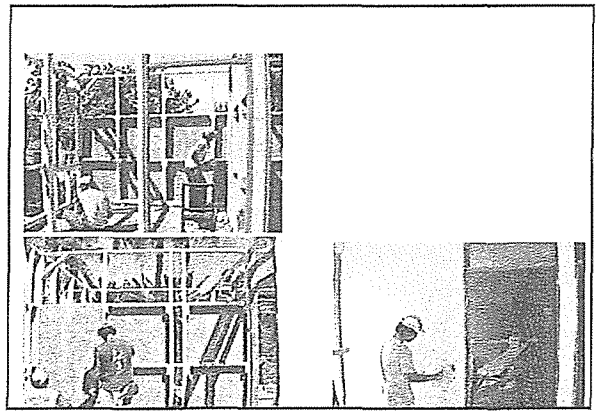

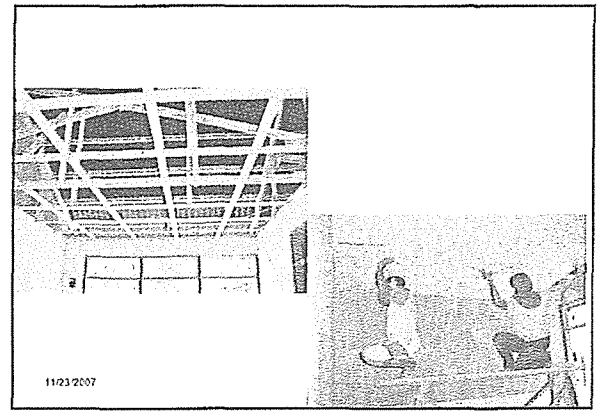
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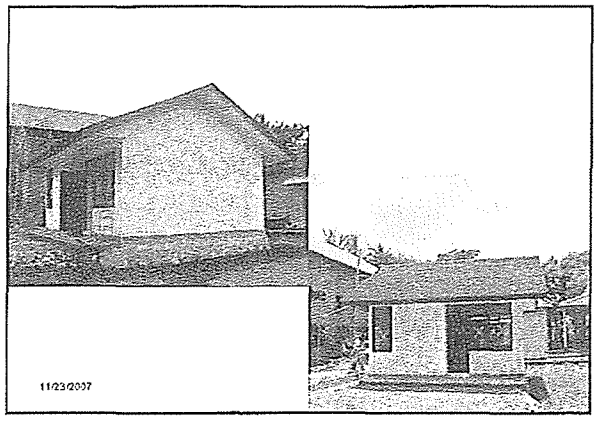
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4. Current State of Wooden Architecture and Challenging issues in Malaysia

Ir. Mohamad Nor bin Mohd Dros

The Current State of Wooden Architecture and Challenging Issues in Malaysia

- The presentation is focusing on Wooden Architecture in Malaysia.

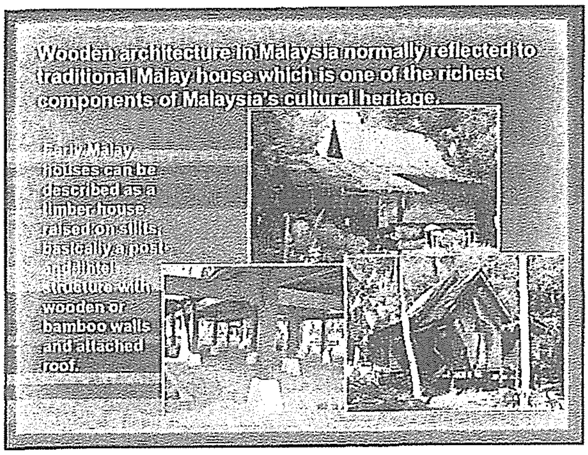
- Wooden Architecture in Malaysia is portrayed by traditional Malay house that also being influenced by the historical of timber construction which usually used by the Malay society many years ago. The main factors are based on sources, climate and culture. According to a case study, timber usage within the modern era is based on traditional and aesthetic value, plus a sustainable design. Furthermore, it also touches on the challenging issues that are faced by timber architecture in Malaysia.

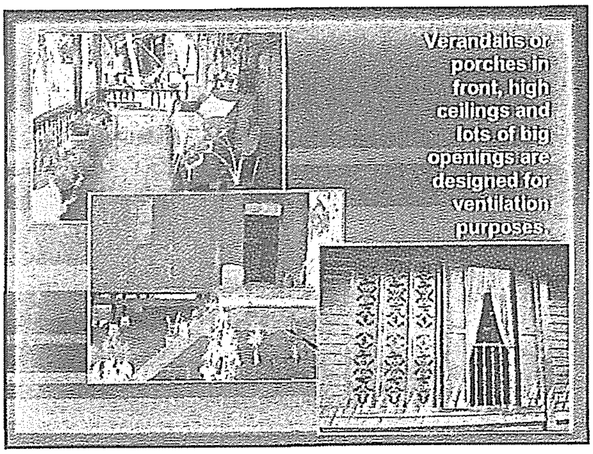
マレーシアおける木造建築の現状と課題

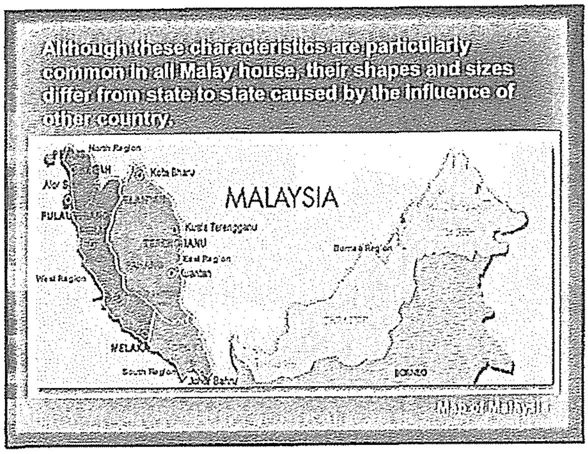
マレーシアの木造建築について発表する。

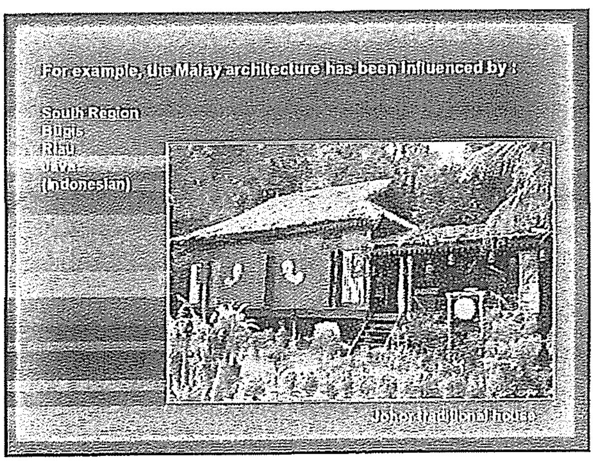
昔の木造家屋を起源とするマレーシアの伝統住宅を見れば、この国の木造建築がよくわかる。主にロケーション、気候、文化などの影響を受けている。
あるケーススタディを用いて、歴史的価値、芸術的価値、そしてサステナビリティ・デザインをベースに木材を使用している現状を紹介する。さらに、木造建築が抱えている課題にもついても触れる。

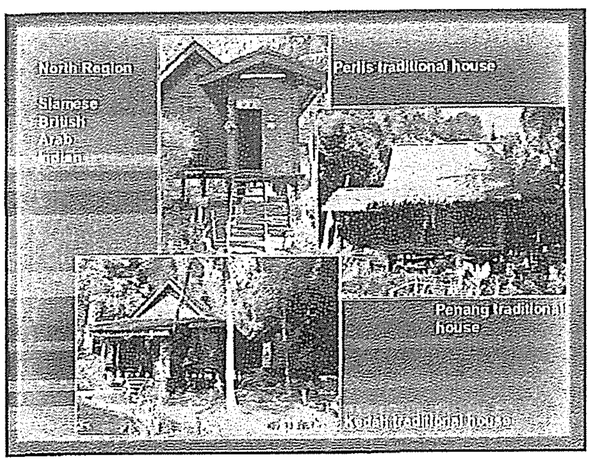

CURRENT STATE OF WOODEN ARCHITECTURE AND CHALLENGING ISSUES IN MALAYSIA
Presented By :
Ir. Mohamad Nor bin Mohd Dros
Director
Project Implementation and Maintenance Branch
Ministry of Housing and Local Government Malaysia

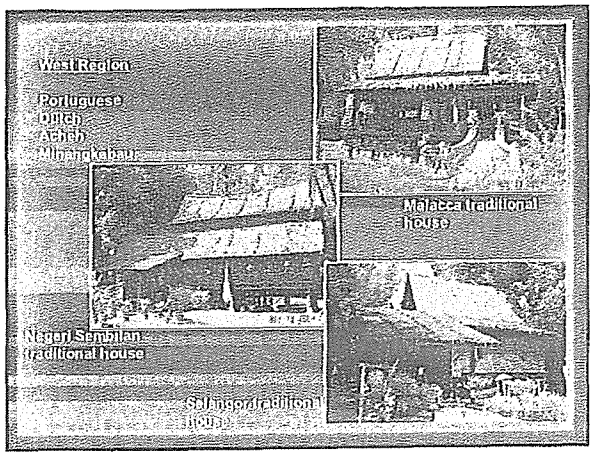

Wooden architecture in Malaysia normally reflected to traditional Malay house which is one of the richest components of Malaysia's cultural heritage.
Early Malay houses can be described as a timber house raised on stilts, basically a post-and-lintel structure with wooden or bamboo walls and attached roof.

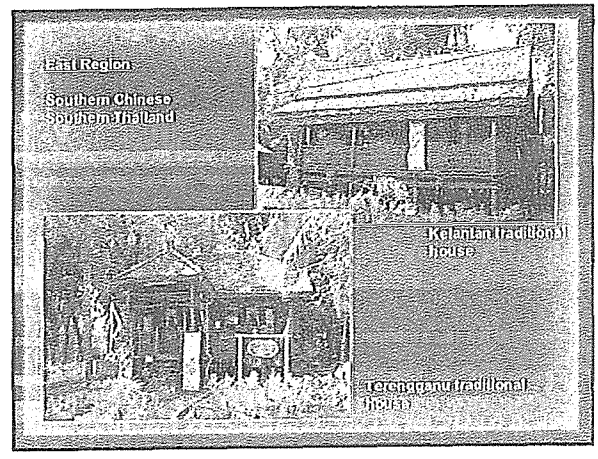

Verandahs or porches in front, high ceilings and lots of big openings are designed for ventilation purposes.

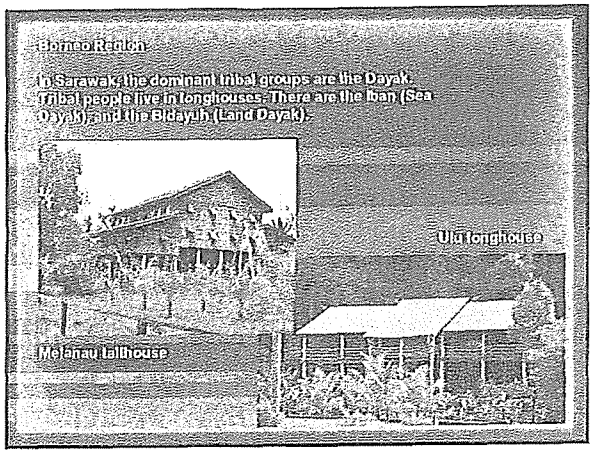

Although these characteristics are particularly common in all Malay house, their shapes and sizes differ from state to state caused by the influence of other country.
MALAYSIA
North Region
Kota Bharu
Kuala Terengganu
East Region
Kuantan
West Region
Borneo Region
South Region
Johor Bahru
Map of Malaysia

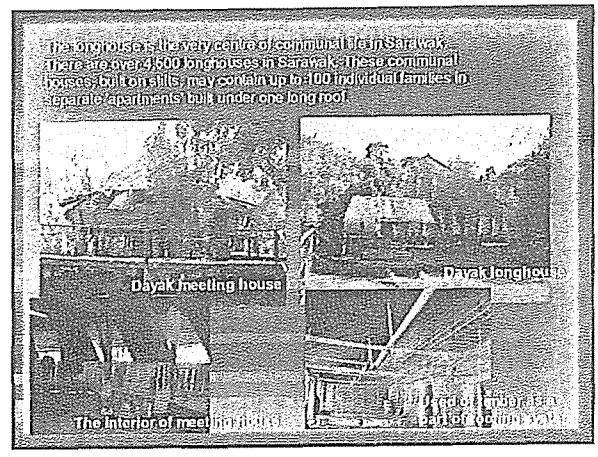

For example, the Malay architecture has been influenced by :
South Region
Bugis
Riau
Java
(Indonesian)
Johor traditional house

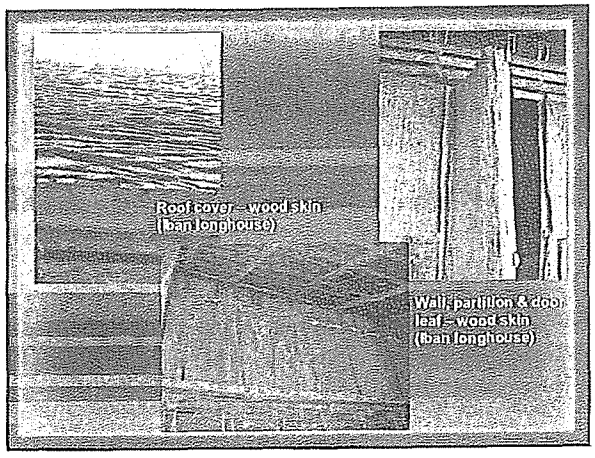

North Region
Siamese
British
Arab
Indian
Perlis traditional house
Penang traditional house
Kedah traditional house

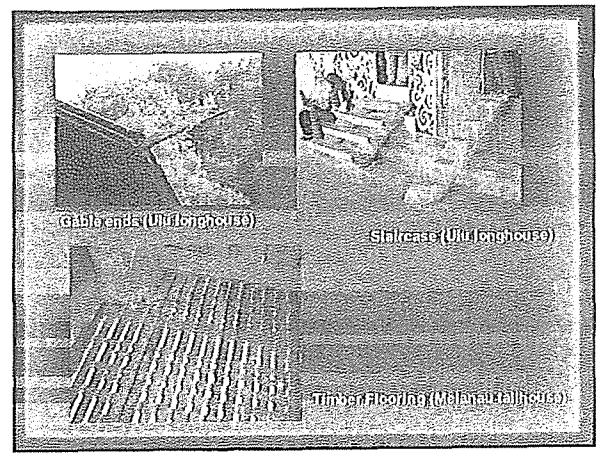

West Region
Portuguese
Dutch
Acheh
Minangkabau
Melaka traditional house
Negeri Sembilan traditional house
Selangor traditional house

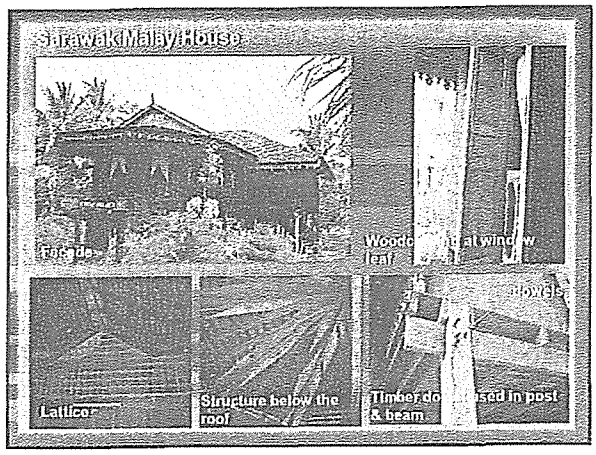

East Region
Southern Chinese
Southern Thailand
Kelantan traditional house
Terengganu traditional house

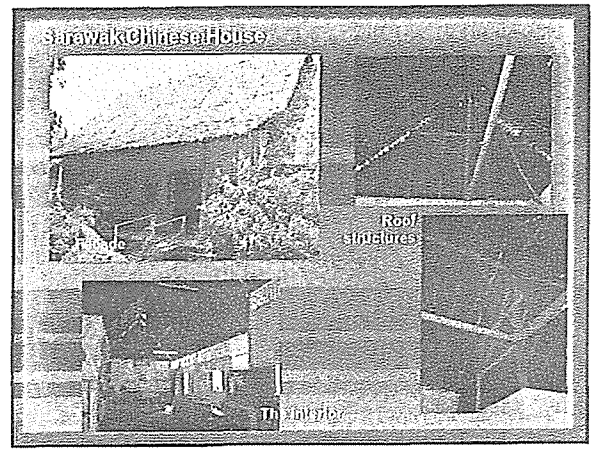

Borneo Region
In Sarawak, the dominant tribal groups are the Dayak. Tribal people live in longhouses. There are the Iban (Sea Dyak) and the Bidayuh (Land Dayak).
Ulu longhouse
Melanau tallhouse

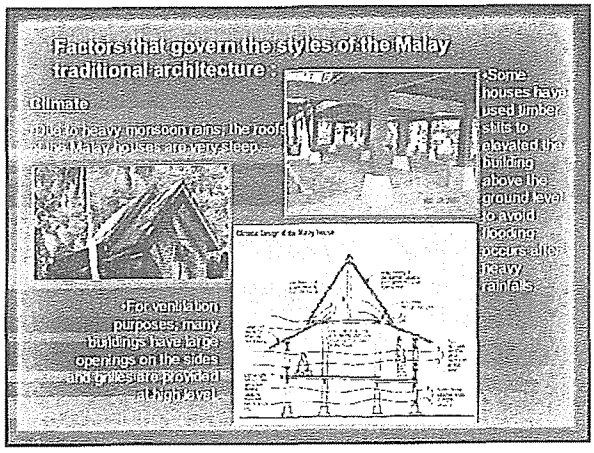

The longhouse - the very centre of communal life in Sarawak. There are over 2,500 longhouses in Sarawak. These communal houses, built on stilts, may contain up to 100 individual families in separate apartments, built under one long roof.
Dayak meeting house
Dayak longhouse
The interior of meeting house

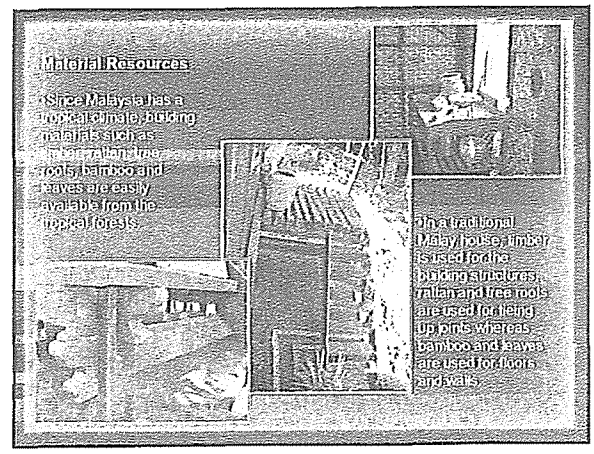

Roof cover - wood skin (Iban longhouse)
Wall, partition & door leaf - wood skin (Iban longhouse)

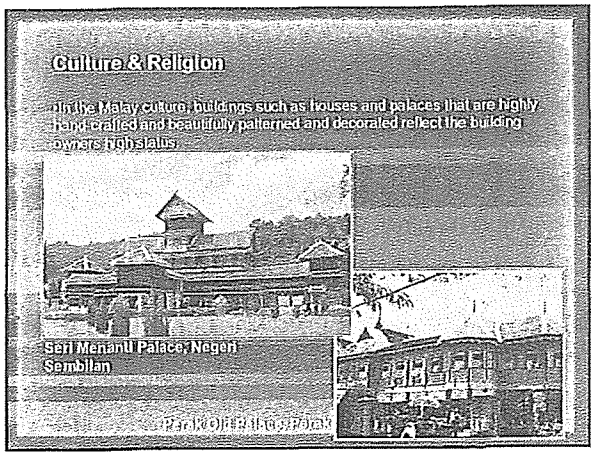

Gable ends (Ulu longhouse)
Staircase (Ulu longhouse)
Timber Facade (Melanau tallhouse)

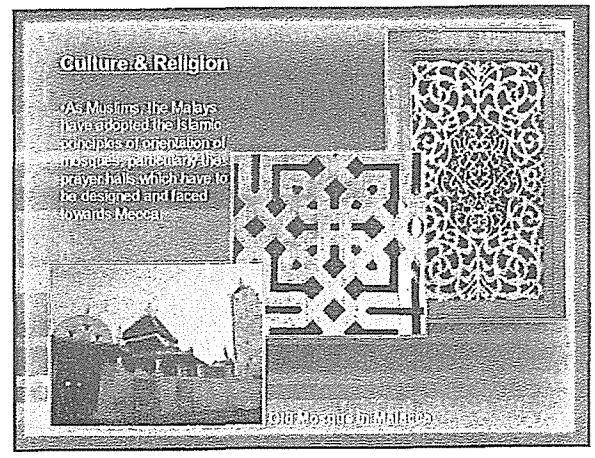

Sarawak Malay House
Lattice
Structure below the roof

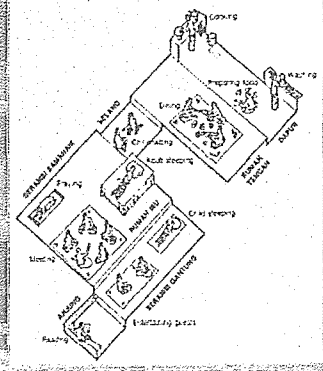

Sarawak Chinese House
Roof structures


Factors that govern the styles of the Malay traditional architecture :
Climate
Some houses have used timber stilts to elevated the building above the ground level to avoid flooding occurs after heavy rainfalls.
For ventilation purposes, many buildings have large openings on the sides and gables are provided at high level.


Material Resources
Since Malaysia has a tropical climate, building materials such as timber, attap leaves, roofs, bamboo and leaves are easily available from the tropical forests.
In a traditional Malay house, timber is used for the building structures, rattan and tree roots are used for tieing up joints whereas bamboo and leaves are used for roofs and walls.


Culture & Religion
In the Malay culture, buildings such as houses and palaces that are highly hand-crafted and beautifully patterned and decorated reflect the building owners high status.
Seri Menanti Palace, Negeri Sembilan


Culture & Religion
As Muslims, the Malays have adopted the Islamic principles of orientation of mosques, particularly the prayer halls which have to be designed and faced towards Mecca.
Kg Hulu Mosque, Malacca



- Some of the traditional Malay houses have floors at different levels, indicating the room functions but also giving the sense of spatial transition in the building.

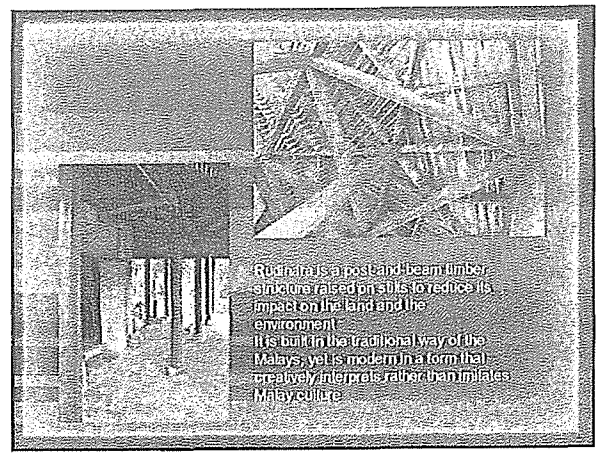
Modern Wooden Architecture

Modern Wooden Architecture

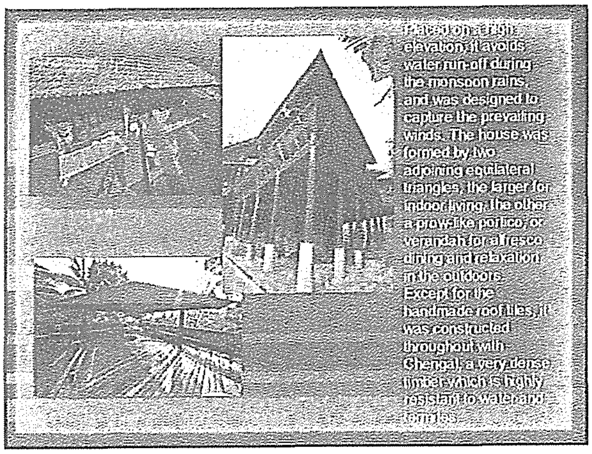
- Today, the styles of the Malay traditional architecture have inspired many young architects and engineers in designing Malaysia's contemporary architecture.
- Using timber on designing the modern building, the designer have focused their design concepts on the Malay traditional architecture, particularly the Malay houses and palaces.

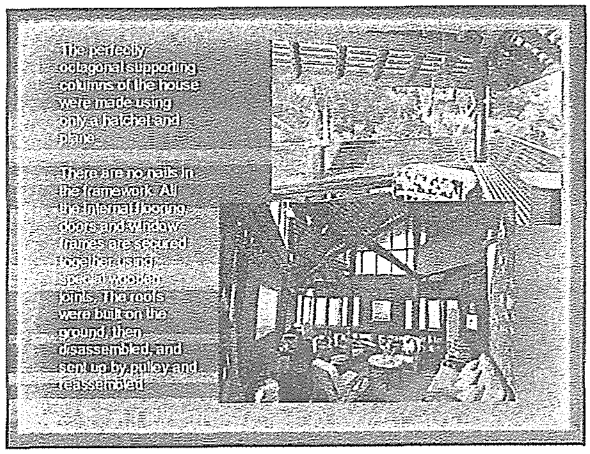
CASE STUDY
Modern Wooden Architecture in Malaysia

RUDINARA
A Handmade House

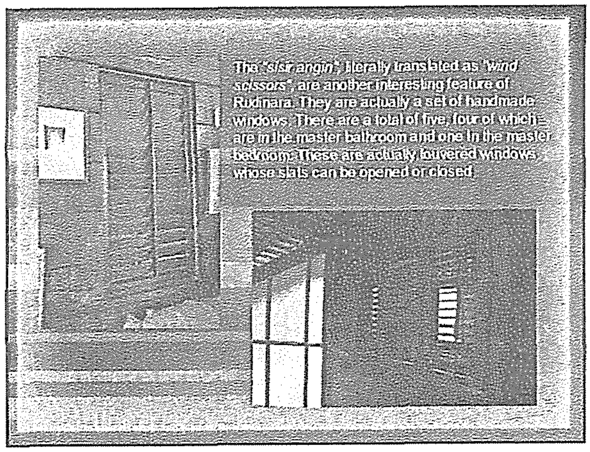


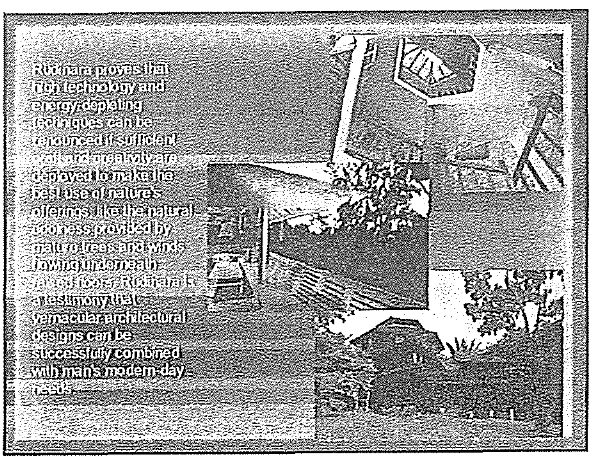
- Rudinara is a post and beam timber structure raised on stilts to reduce its impact on the land and the environment.
- It's built in the traditional way of the Malays, yet is modern in a form that creatively interprets rather than imitates Malay culture.

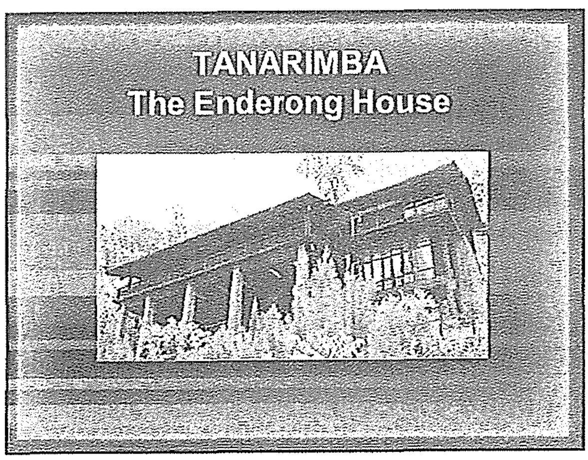

Placed on a high elevation, it avoids water run-off during the monsoon rains, and was designed to capture the prevailing winds. The house was formed by two adjoining equilateral triangles, the larger for indoor living, the other a prow-like portico, or verandah for alfresco dining and relaxation in the outdoors. Except for the handmade roof tiles, it was constructed throughout with Chengal, a very dense timber which is highly resistant to water and termites.

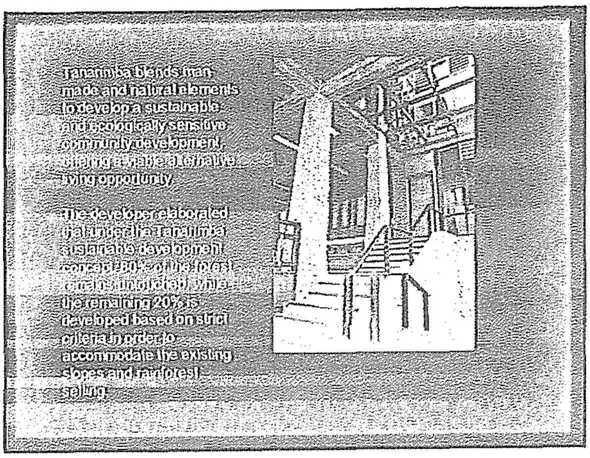

The perfectly octagonal supporting columns of the house were made using only a hatchet and plane.
There are no nails in the framework. All the internal flooring, doors and window frames are secured together using special wooden joints. The roofs were built on the ground, then disassembled, and sent up by pulley and reassembled.

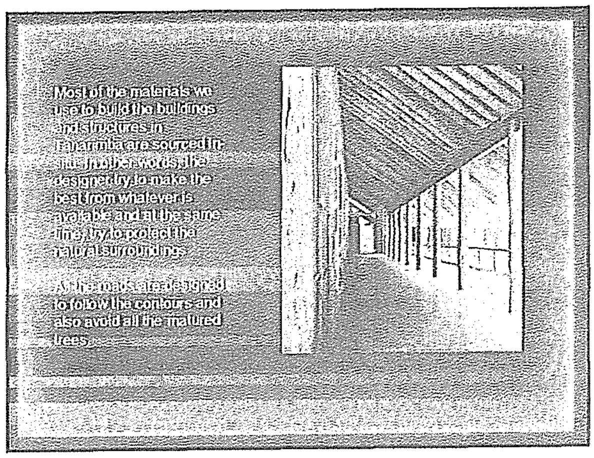

There are nails on the verandah benches, and for the battens, called *Kayu Jenal* which support the imbricated clay roof tiles.
The roof of the first level is from Chengal planks but underneath these roofs there are spaced slats which allow air to circulate.

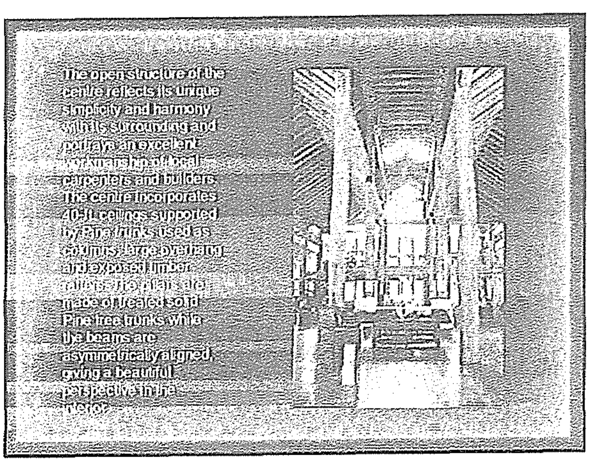

The *"sisir angin"*, literally translated as *"wind scissors"*, are another interesting feature of Rudinara. They are actually a set of handmade windows. There are a total of five, four of which are in the master bathroom and one in the master bedroom. These are actually louvered windows whose slats can be opened or closed.

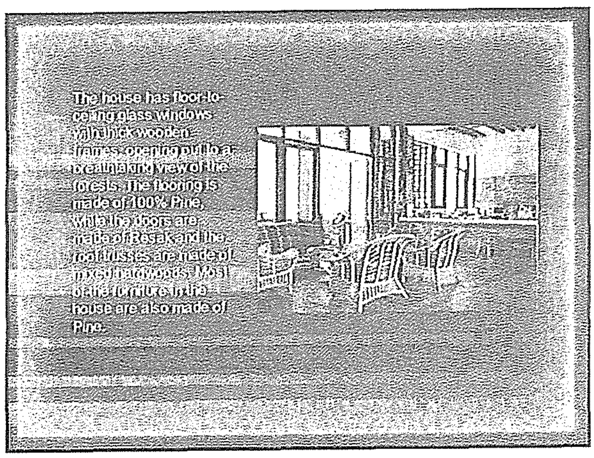

Rudinara proves that high technology and energy-depleting techniques can be renounced if sufficient craft and creativity are deployed to make the best use of nature's offerings, like the natural coolness provided by mature trees and winds flowing underneath raised floors. Rudinara is a testimony that vernacular architectural designs can be successfully combined with man's modern-day needs.

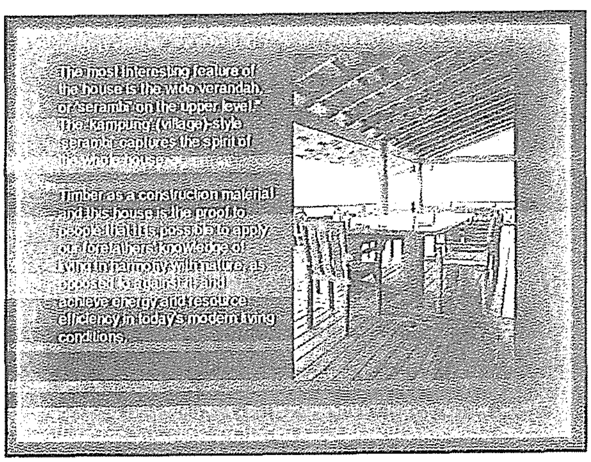

TANARIMBA
The Enderong House

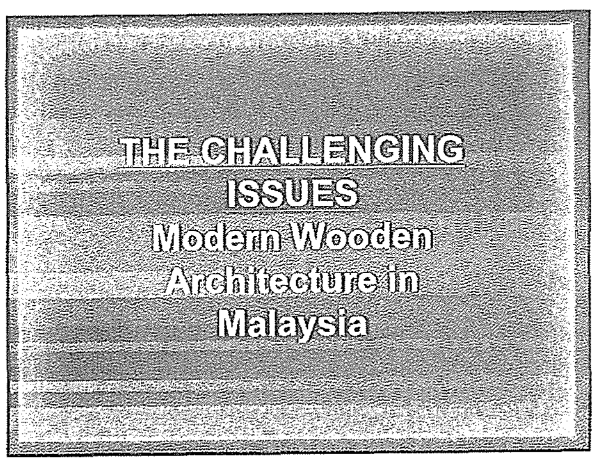

Tanarimba blends man-made and natural elements to develop a sustainable and ecologically sensitive community development, offering a viable alternative living opportunity.
The developer elaborated that under the Tanarimba sustainable development concept 80% of the forest remains untouched, while the remaining 20% is developed based on strict criteria in order to accommodate the existing slopes and rainforest setting.

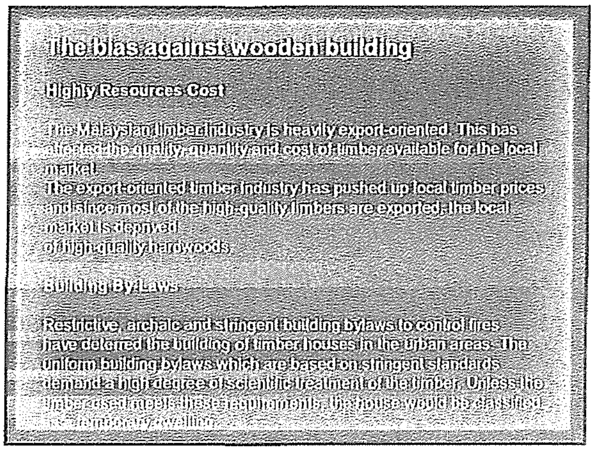

Most of the materials we use to build the buildings and structures in Tanarimba are sourced in-situ. In other words, the designer try to make the best from whatever is available and at the same time, try to protect the natural surroundings.
All the roads are designed to follow the contours and also avoid all the matured trees.

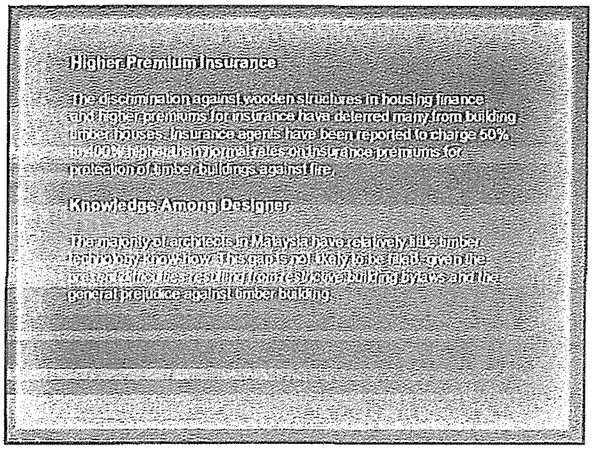

The open structure of the centre reflects its unique simplicity and harmony with its surrounding and portrays an excellent workmanship of local carpenters and builders. The centre incorporates 40-ft ceilings supported by Pine trunks used as columns, large overhang and exposed timber rafters. The pillars are made of treated solid Pine tree trunks while the beams are asymmetrically aligned, giving a beautiful perspective in the interior.


The house has floor-to-ceiling glass windows with thick wooden frames opening out to a breathtaking view of the forests. The flooring is made of 100% Pine, while the doors are made of Resak and the roof trusses are made of mixed hardwoods. Most of the furniture in the house are also made of Pine.


The most interesting feature of the house is the wide verandah, or 'serambi' on the upper level. The 'kampung' (village)-style serambi captures the spirit of the whole house.
Timber as a construction material and this house is the proof to people that it is possible to apply our forefathers' knowledge of living in harmony with nature, as opposed to against it, and achieve energy and resource efficiency in today's modern living conditions.


THE CHALLENGING ISSUES
Modern Wooden Architecture in Malaysia


The bias against wooden building
Highly Resources Cost
The Malaysian timber industry is heavily export-oriented. This has
affected the quality, quantity and cost of timber available for the local
market.
The export-oriented timber industry has pushed up local timber prices
and since most of the high-quality timbers are exported, the local
market is deprived
of high-quality hardwoods.
Building By-Laws
Restrictive, archaic and stringent building bylaws to control fires
have deterred the building of timber houses in the urban areas. The
uniform building bylaws which are based on stringent standards
demand a high degree of scientific treatment of the timber. Unless the


Higher Premium Insurance
The discrimination against wooden structures in housing finance
and higher premiums for insurance have deterred many from building
timber houses. Insurance agents have been reported to charge 50%
to 400% higher than normal rates on insurance premiums for
protection of timber buildings against fire.
Knowledge Among Designer
The majority of architects in Malaysia have relatively little timber
general prejudice against timber building.

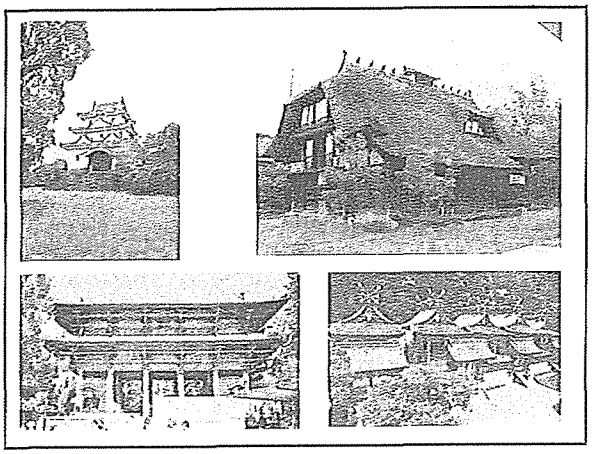

Terima Kasih
Thank You

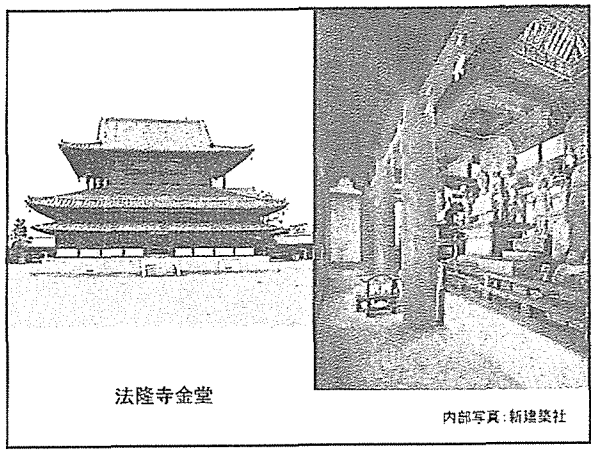
５．日本における木造建築史・伝統的建築物等の保存修復について

後藤　治　教授

歴史的建造物の保存修復からみた
木材の利用と伝統構法の将来

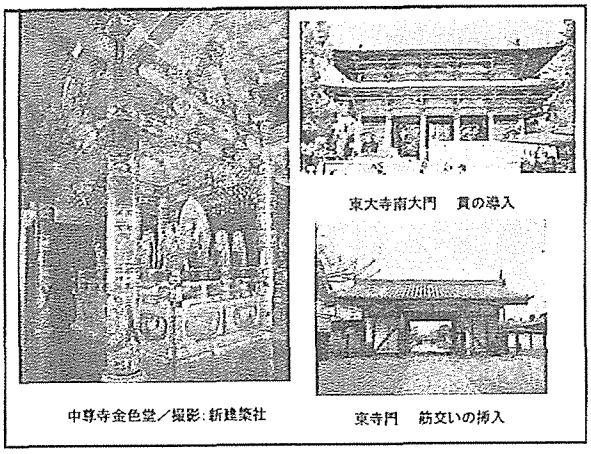
工学院大学・工学部・建築都市デザイン学科
教授　後藤　治





法隆寺金堂

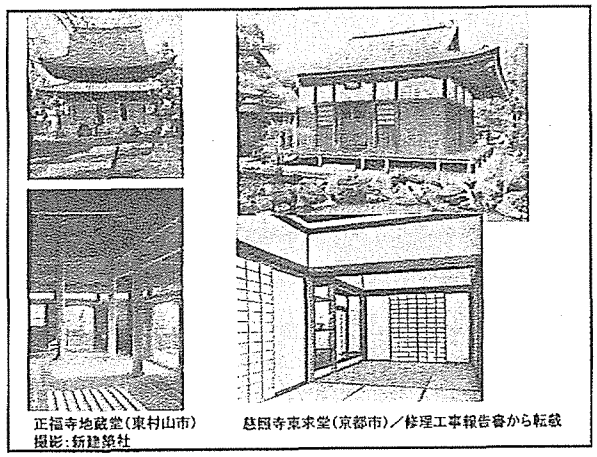
内部写真：新建築社



東大寺南大門　貫の導入

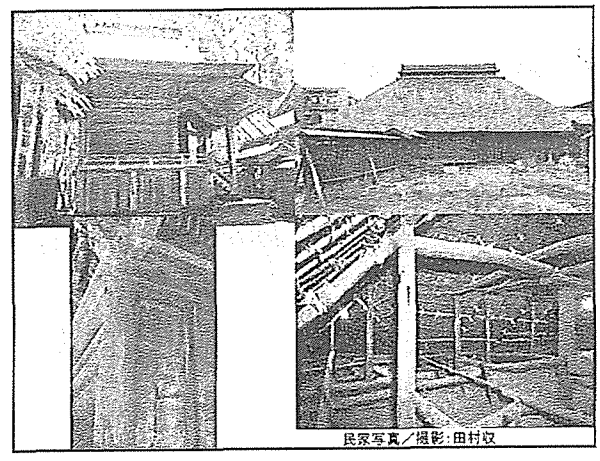
中尊寺金色堂／撮影：新建築社

室寺門　筋交いの挿入



正福寺地蔵堂（東村山市）
撮影：新建築社

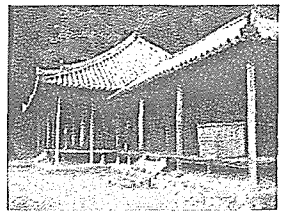
慈圓寺東求堂（京都市）／修理工事報告書から転載



民家写真／撮影：田村収

調査

対象：重要文化財　福勝寺



調査期間　：　２００５年２月～１１月
調査回数　：　４回
対象部材　：　全部材　６７７点

所在地
和歌山県海南市下津町
構造形式
桁行三間、梁間三間、寄棟造、本瓦葺及び桟瓦

福勝寺平面図　　福勝寺南側立図

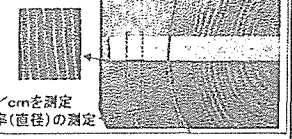
調査項目

2 年輪の計測

3.節の量測定

4.辺材の有無の測定

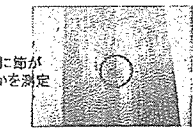
年輪の計測



本／cmを測定
曲率(直径)の測定

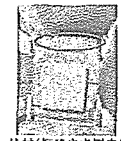
節の量測定

部材の何面に節がついているかを測定



辺材の有無の測定

柱材(福勝寺本堂)

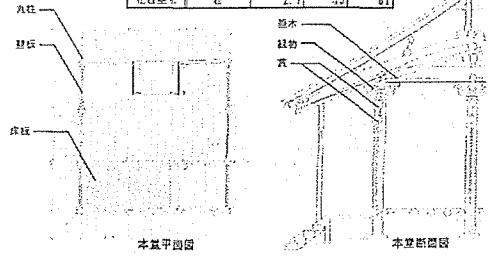


柱材(福勝寺求聞寺堂)

調査結果（当初材の樹齢）

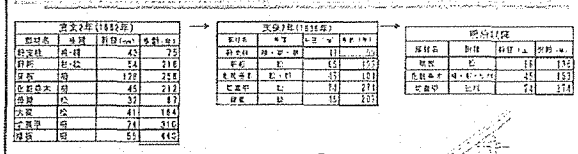
約５００年前から残存する部位と品質

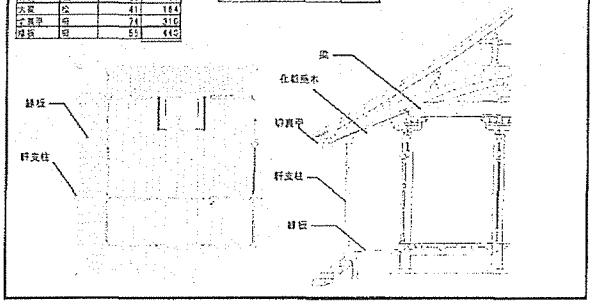
部材名	樹種	年輪幅(本/cm)	材径(cm)	樹齢(年)
丸柱	桧・檜・桧	2.5	56	84
組物	檜・檜	4.6	45	115
貫	松	6.1	55	160
腰板	松	4	120	256
床板	松	4	120	256
化粧垂木	松	2.7	45	61



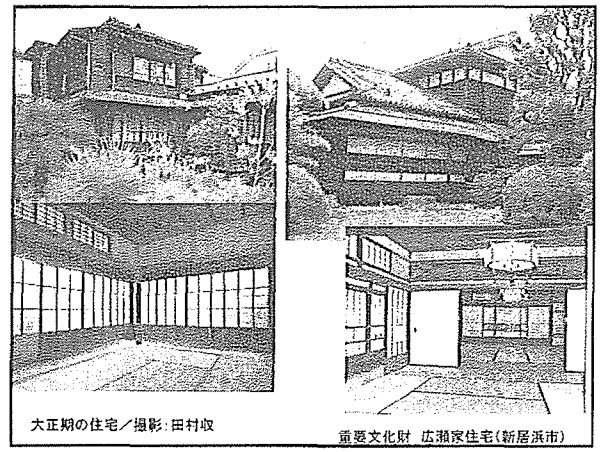
本堂平面図　　本堂断面図

調査結果（時代別の補足の樹齢）



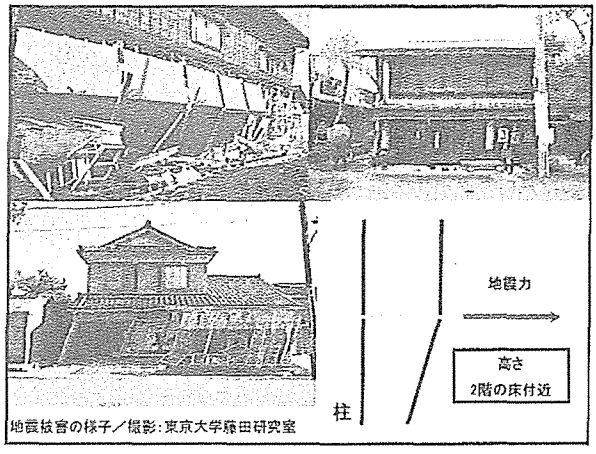


考察及び提案

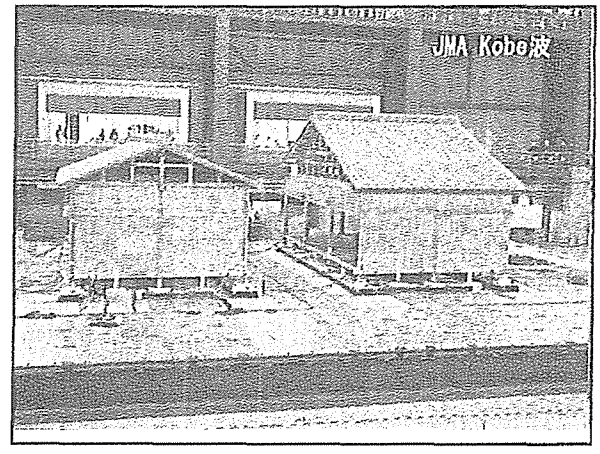


大正期の住宅／撮影：田村収

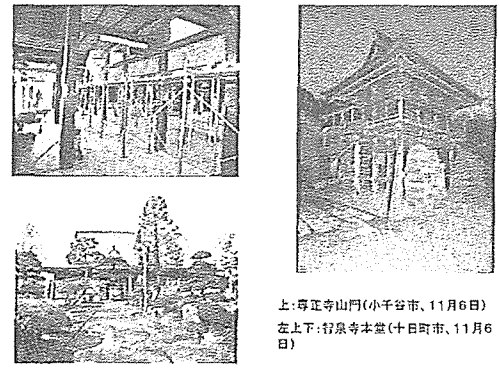
重要文化財　広瀬家住宅(新居浜市)



地震被害の様子／撮影：東京大学藤田研究室



地震2週間後の応急措置・復旧の状況

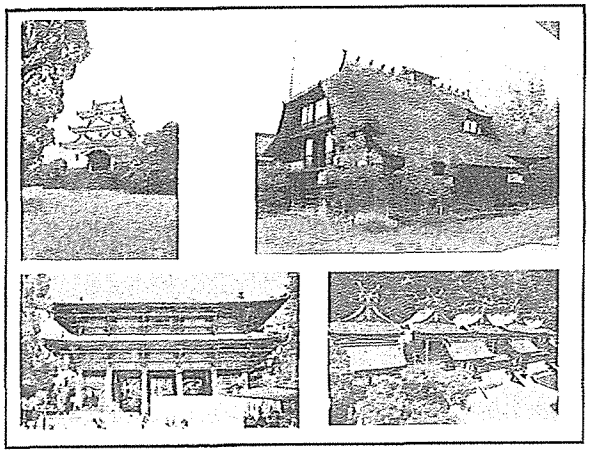


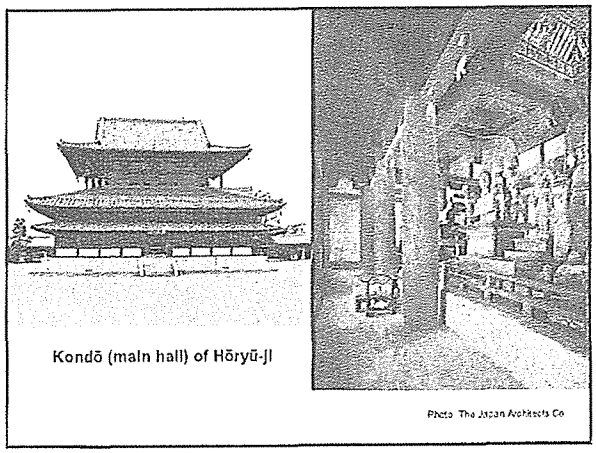
上：専正寺山門（小千谷市、11月6日）
左上下：行泉寺本堂（十日町市、11月6日）

Use of wood and traditional building construction methods in the future in consideration of preservation and restoration of historical wooden architecture

Professor Osamu Goto

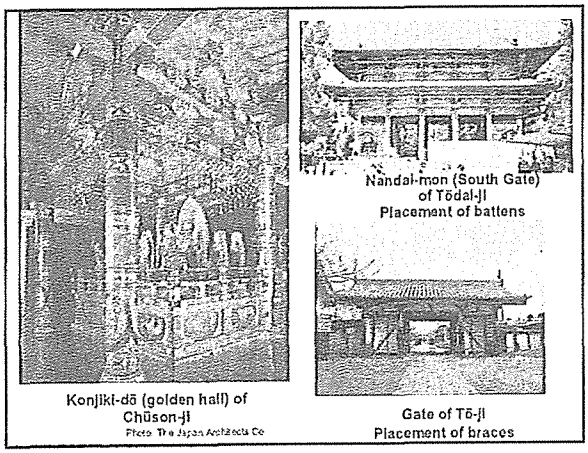
Department of Design Architecture and Urbanism,
Faculty of Engineering,
Kogakuin University





Kondō (main hall) of Hōryū-ji

Photo: The Japan Architects Co

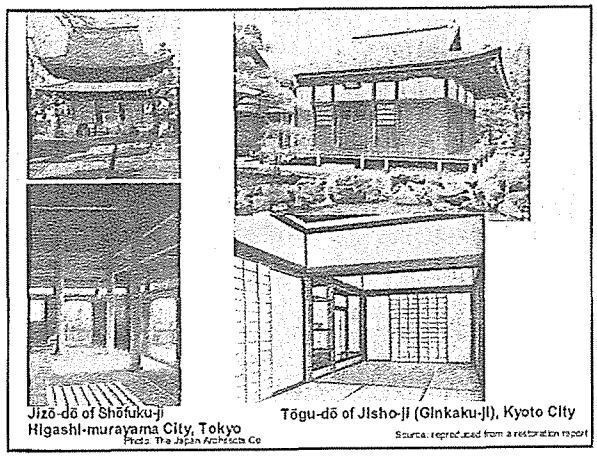


Konjiki-dō (golden hall) of Chūson-ji

Photo: The Japan Architects Co

Nandai-mon (South Gate) of Tōdai-ji
Placement of battens

Gate of Tō-ji
Placement of braces

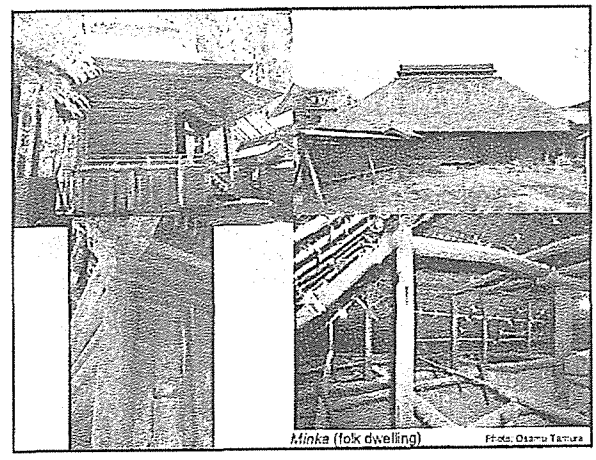


Jizō-dō of Shōfuku-ji
Higashi-murayama City, Tokyo

Photo: The Japan Architects Co

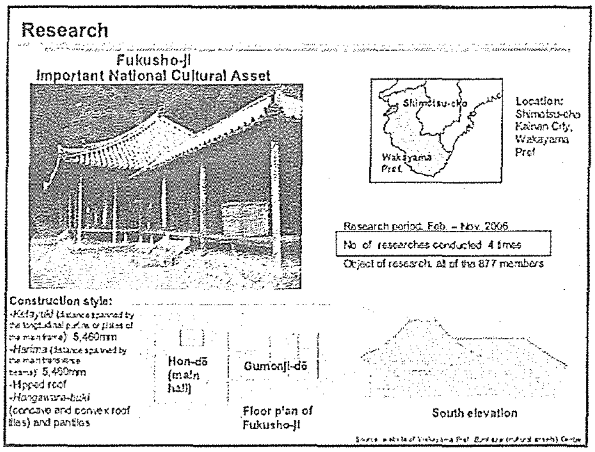
Tōgu-dō of Jisho-ji (Ginkaku-ji), Kyoto City

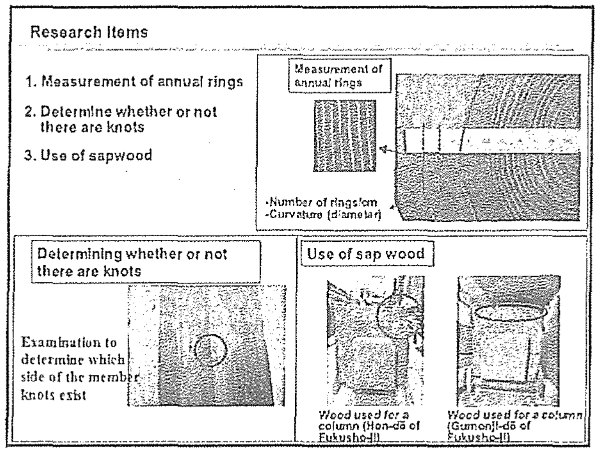
Source: reproduced from a restoration report

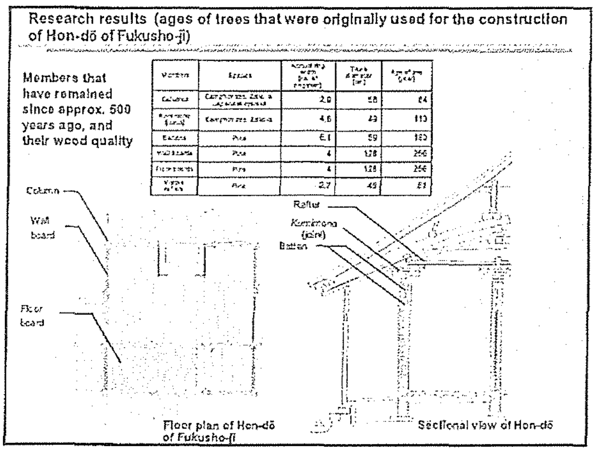


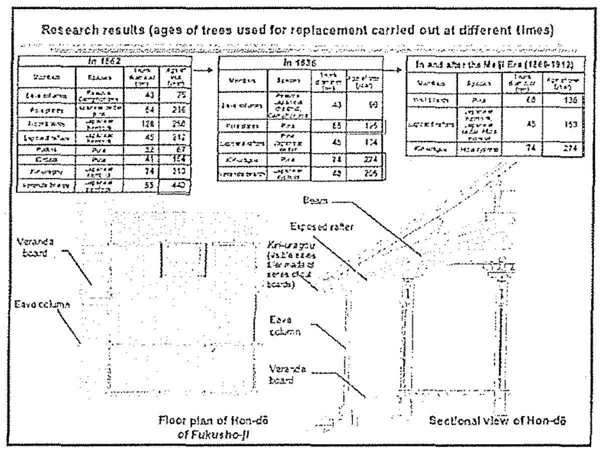
Minka (folk dwelling)

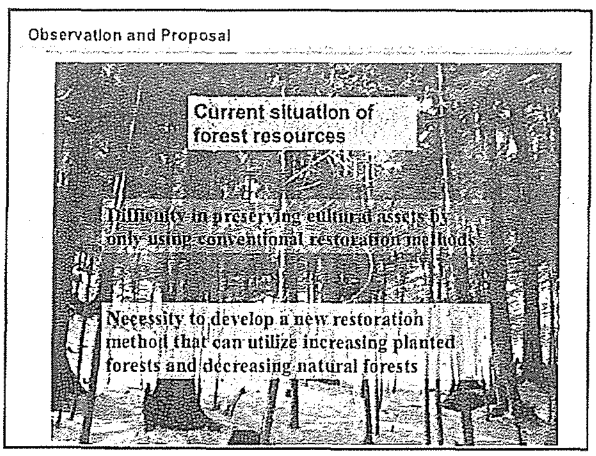
Photo: Osamu Tamura

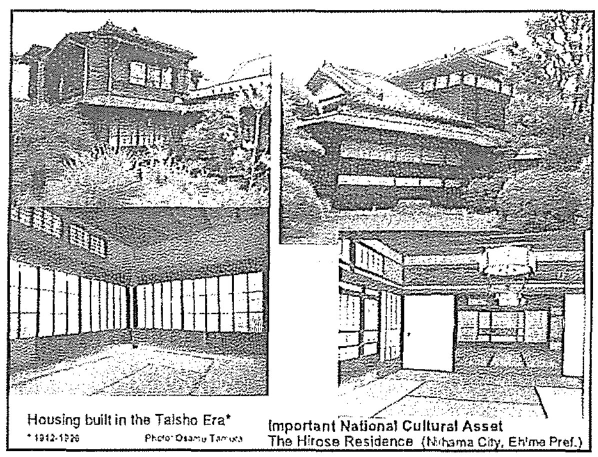

Research
Fukusho-ji
Important National Cultural Asset
Location: Shimotsu-cho Kainan City, Wakayama Pref
Shimotsu-cho
Wakayama Pref.
Research period: Feb. – Nov. 2006
No. of researches conducted: 4 times
Object of research: all of the 877 members
Construction style:
5,460mm
5,460mm
-Hipped roof
Hon-dō (main hall)
Gumonji-dō
Floor plan of Fukusho-ji
South elevation

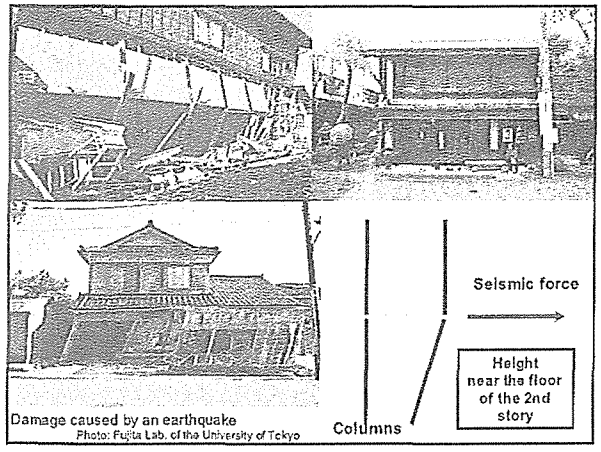

Research Items
1. Measurement of annual rings
2. Determine whether or not there are knots
3. Use of sapwood
Measurement of annual rings
-Number of rings/cm
-Curvature (diameter)
Determining whether or not there are knots
Examination to determine which side of the member knots exist
Use of sap wood
Wood used for a column (Hon-dō of Fukusho-ji)
Wood used for a column (Gumonji-dō of Fukusho-ji)


Research results (ages of trees that were originally used for the construction of Hon-dō of Fukusho-ji)
Members that have remained since approx. 500 years ago, and their wood quality
Column
Wall board
Floor board
Rafter
Batten
Floor plan of Hon-dō of Fukusho-ji
Sectional view of Hon-dō

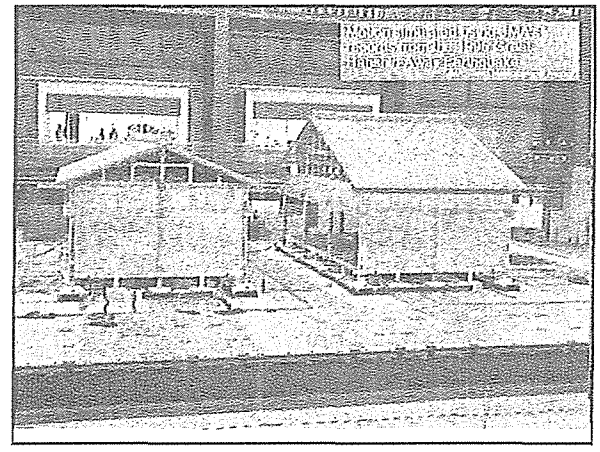

Research results (ages of trees used for replacement carried out at different times)
In 1662
In 1836
In and after the Meiji Era (1868-1912)
Beam
Exposed rafter
Veranda board
Eave column
Floor plan of Hon-dō of Fukusho-ji
Sectional view of Hon-dō


Observation and Proposal
Current situation of forest resources
Difficulty in preserving cultural assets by only using conventional restoration methods
Necessity to develop a new restoration method that can utilize increasing planted forests and decreasing natural forests

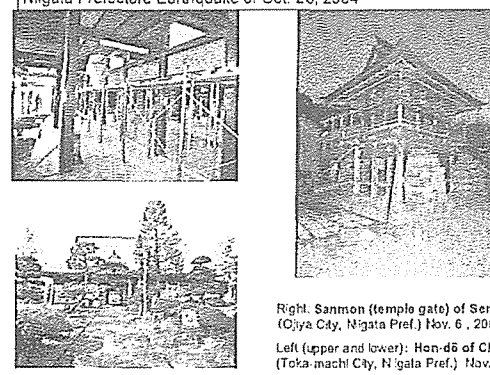

Housing built in the Taisho Era*
* 1912-1926
Photo: Osamu Tamura
Important National Cultural Asset
The Hirose Residence (Niihama City, Ehime Pref.)



Damage caused by an earthquake
Photo: Fujita Lab. of the University of Tokyo



Emergency and rehabilitation measures taken 2 weeks after the Mid-Niigata Prefecture Earthquake of Oct. 23, 2004



Right: Sanmon (temple gate) of Senshō-ji (Ojiya City, Niigata Pref.) Nov. 6 , 2004

Left (upper and lower): Hon-dō of Chisen-ji (Toka-machi City, Niigata Pref.) Nov. 6, 2004

6. A retrospective and prospective review on Wooden Architecture in Myanmar

Mr. Sun Oo

A retrospective and prospective review on Wooden Architecture in Myanmar
ミャンマーにおける木造建築のこれまでとこれから

The paper consists of a retrospective and prospective review on the Wooden Architecture in Myanmar. There are two parts in presentation; the first part is an overview of Wooden Architecture throughout the history of Myanmar, presented in a chronological order. The second part concentrates on the current situation of wooden buildings in the recent construction industry.

By looking back the history of Wooden Architecture in Myanmar, it is very interesting to realize that the challenging issues were existed, such as the emergence of new functional requirements, experimenting new technologies, adoption of new construction methods and the availability of timber etc., along the stages of wooden building design and construction. Because of these challenging issues, the progressive development of Wooden Architecture occurred throughout the historical periods.

As the urbanization rate is lower than the developed neighboring countries, the majority of Myanmar people still live in rural areas where almost all the houses can be seen as wooden buildings. On the other hand, new developments projects and new houses in urban areas use new building materials such as reinforced concrete and steel.

Now, the time has come to re-think about the future of wooden buildings in Myanmar based upon; the existing reserves of natural resources, the sustainability for the future generation and the least negative environmental impact.

ミャンマーにおける木造建築のこれまでとこれからについて発表する。はじめに、これまでのミャンマーの木造建築について年代順に概説し、そのあとで建築業界における木造建築の現状をお伝えしたい。

ミャンマーでは木造建築の計画と施工にあたり、新しい機能要求への取り組み、新技術や新工法の採用、木材使用の可能性の模索など、長年にわたり多くの課題に直面してきた。こういった課題の多さゆえに木造建築の存続があったこともまた事実である。

ミャンマーは近隣国よりも都市化が遅れており、人口の大部分が郊外の木造住宅で生活している。一方都市部では、鉄骨造やRC造などの新しい技術が、住宅を含む多くのプロジェクトで採用され始めている。

今こそミャンマーの木造建築の未来について改めて考えていかなければならないときである。限られた自然資源について、建築物のサステナビリティについて、そしてそれが環境へ与える影響について---。

Wooden Architecture in Myanmar

Title: Current State of Wooden Architecture and Challenging Issues in Myanmar

Subtitle: **A retrospective and prospective review on Wooden Architecture in Myanmar**

Sun Oo

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Department of Architecture
Yangon Technological University
Mandalay Technological University

Wooden Architecture Forum
27-28 November, 2007, Tokyo, Japan

This paper consists of a retrospective and prospective review on the Wooden Architecture in Myanmar. The presentation has two parts; the first part is an overview of Wooden Architecture in Myanmar presented in a chronological order. The second part concentrates on the current situation of wooden buildings in the construction industry.

Types of Architecture in Myanmar

Based upon the use of different construction materials, architecture in Myanmar can simply be classified under three main categories; **Wooden Architecture**, **Brick architecture**, and **New Architecture** respectively. Wooden architecture and Brick architecture flourished since the very beginning of Myanmar cultural history and gradually developed until recent times.

As a result of introducing new building materials such as cast iron, steel, reinforced concrete and various types of glass etc., together with new construction technologies, a new type of architecture emerged in the early decades of the nineteenth century, which such buildings can be classified under the last category, "New Architecture".

Architect historians named this type of architecture as "modern architecture" or alike.

A brief history of Architecture in Myanmar

The Architecture in Myanmar can be divided in to the following periods;

- Pre-Bagan and Bagan Period - *1st. century AD to mid14th. century AD*
- Middle and Konebong Period - *mid 14th. century AD to 1885AD*
- British Colonial Period - *1885 AD to 1948 AD*
- Post Independence Period - *1948AD to Present time*

The traces of foundations, plinths and artifacts of ancient buildings, date back to, as early as 3rd to 4th. centuries AD and the earliest interior space of the surviving brick structure enclosed by floors, walls, and roof can be found in a few temples of the ancient city of Srikshetra, which was flourished between 8th., to 9th. Centuries AD.

Wooden Architecture in Myanmar

Wooden Architecture, which is the most significant type of architecture in Myanmar, has a very long story as this type of architecture flourish throughout the history since the dawn of Myanmar civilization until the present time.

Although there were no surviving examples of wooden buildings of early period and Bagan period, a lot of fine examples of middle and Konebong period wooden architecture were survived and still can be seen until now.

The scholars analyzed that the most glorious period of Wooden Architecture in Myanmar was *Konebong* period (1752AD to 1885AD).

In British colonial period (1885AD to 1948AD), drastic changes in Wooden Architecture took place by adopting new structural timber member sizes, new structural systems and new construction details. This type of Wooden Architecture is now acknowledged as part of Myanmar cultural heritage.

Currently, the wooden buildings are mainly used as houses in rural areas all over the country. In Urban areas, on the other hand, most of the new buildings, such as residential, governmental, Institutional, commercial and civic buildings are now built by reinforced concrete and steel.

Recently, the fine examples of contemporary Wooden Architecture can be found only in specially required buildings such as resort hotels, cultural buildings, religious buildings and specially designed residences.

Development of wooden architecture

By looking back the history of Wooden Architecture in Myanmar, it is very interesting to realize that the challenging issues were existed, such as the emergence of new functional requirements, experimenting new technologies, adoption of new construction methods and the availability of timber at the time etc. Because of these challenging issues, the progressive development of Wooden Architecture occurred throughout the historical periods.

There are no surviving wooden buildings of pre-Bagan and Bagan period but from few evidences, the researchers can conclude that there once were a lot of wooden structures. Some of the Bagan period structures were brick and wood composite structures. The wooden structure portions were all perished because of gradual decay by the severe tropical climate, destroyed by several wars or destroyed by the fire. Most of the brick structures of this period had wooden building components such as wooden doors, wooden attics and wooden beams etc.

The temples of the middle and Konebong period had the same spatial composition as Bagan temples, but notably wooden structural members were substituted to the buildings and successfully developed a new type of structure which was different from the predecessor *brick only structures*.

In the colonial period, new measuring units called FPS system was introduced to Myanmar. As a result, the sizes of newly produce timber were changed and the new wooden structural system and construction

details were also introduced. Wooden skeletons in-filled with brick, which is known as Brick-nogged buildings, became popular in various parts of Myanmar. This type of buildings was not only used for residences but also for governmental and institutional buildings.

A few decades after Myanmar got independence from British, the reinforced concrete framed brick residences were the most popular type of building among the middle and upper class Myanmar. These modern houses became a status symbol of the rich people but the majority of Myanmar people, who live in rural areas, enjoyed living in the traditional wooden buildings.

By the end of twentieth century and after the turn of the new millennium, the trend changed vice visa, where the reinforced concrete framed brick fancy residences in the urban areas became ordinary and can be owned by average people of town and cities. Wooden residences and buildings become a luxurious commodity and the wooden buildings in urban areas become status symbols for the elite class.

At present, the demand of timber in construction industry is far more than the availability of timber in local market.

Now, the time has come to re-think about the future of wooden buildings in Myanmar. The existing reserves of natural resources must be taken into account. The sustainability of our environment needs to be given as priority issue and wise selection of building materials for least negative environmental impact should be taken action promptly.

Challenging issues concerning future development & promotion of Wooden Architecture

The following are the issues challenging to Wooden Architecture in Myanmar concerning future development and promotion;

(1) *Reduced production of timber - due to limited resources*

(2) Short of timber supply, for local construction industry

(3) Soaring-high price of timber for construction
(Cost of 2nd. class teak wood for construction is 22 times higher within 10 years and 130 times higher within 20 years)

(4) Decrease in quality of timber for construction;
-wood produced from un-matured trees
-not properly seasoned (less dimensional stability)
-not properly sawn (sub-standard shape and size of timber)
- etc.

(5) Lack of understanding on the importance of sustainability of our environment and that can be achieved by wise selection of proper building materials such as timber, for construction projects.

(6) Lack of awareness on less negative environmental impact of wooden buildings compare to other types of buildings with different materials used.

Suggestions for Future Development and Promotion of Wooden Architecture in Myanmar:

(1)Urgent need of organizing environmental education programs to general public emphasizing the use of environmental friendly building materials such as timber etc.

(2)Urgent need of education programs to general public on importance of sustainable environment, energy efficiency and energy conservation in newly built buildings by proper selection of appropriate building materials such as, timber etc.

(3)Need for latest technology transfer from the developed countries to Myanmar architects, engineers and technicians concerning wooden building construction methods and technology.

(4)Need for contribution from developed countries on establishment of necessary training centers, laboratories, research facilities to conduct timber research works for construction industry in Myanmar.

(5)Need for provision of scholarships, research grants and appropriate arrangements to attend conferences, seminars and workshops on wooden architecture and relative subjects from developed countries to Myanmar researchers.

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Wooden Architecture in Myanmar

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Senior Research Architect

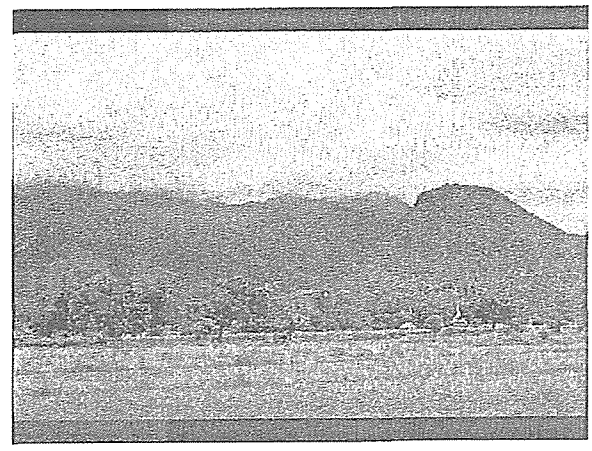
Honorary Professor

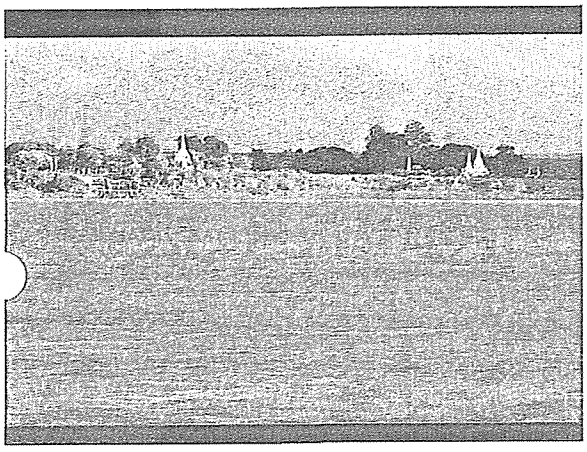
Wooden Architecture in Myanmar

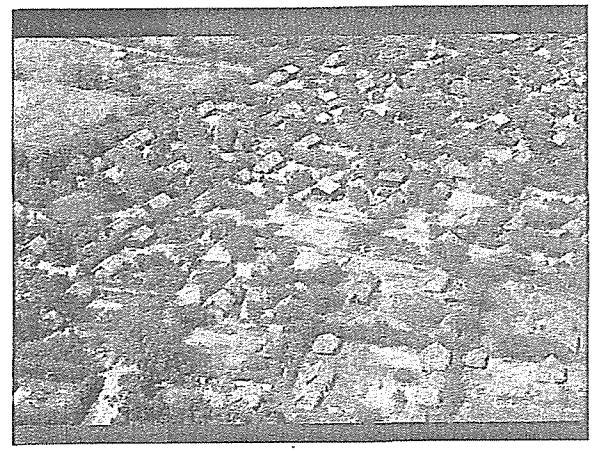
Myanmar

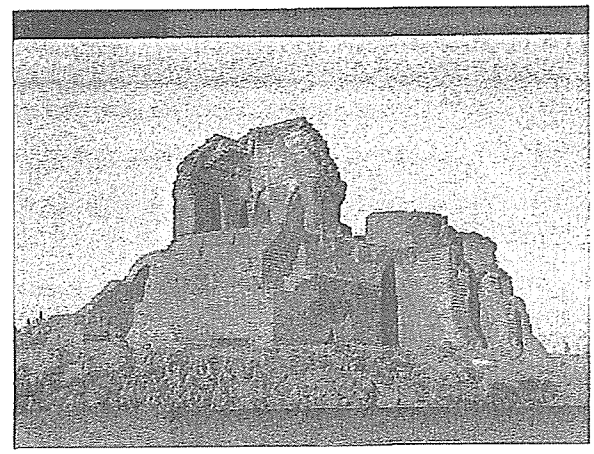
The story : Wooden architecture in Myanmar

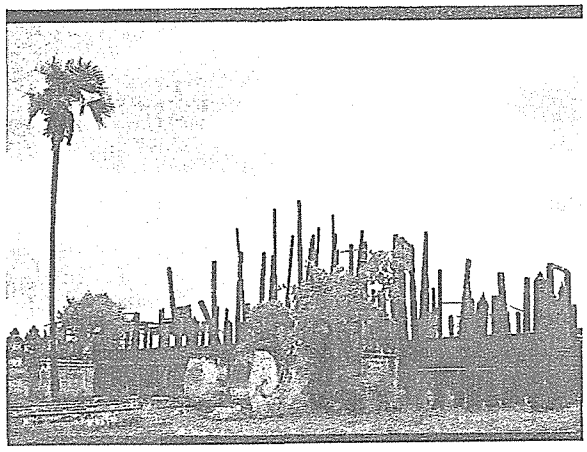
(in chronological order)

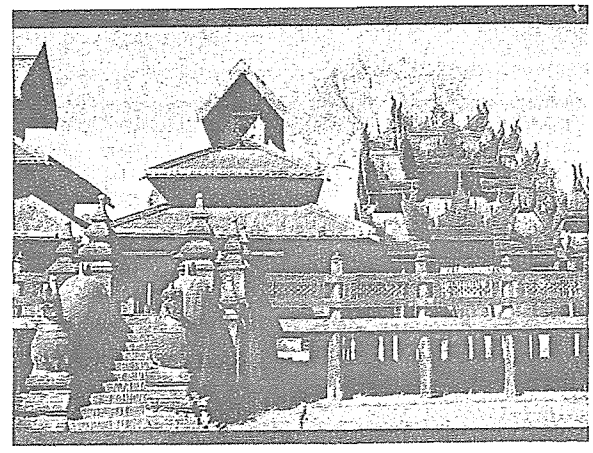


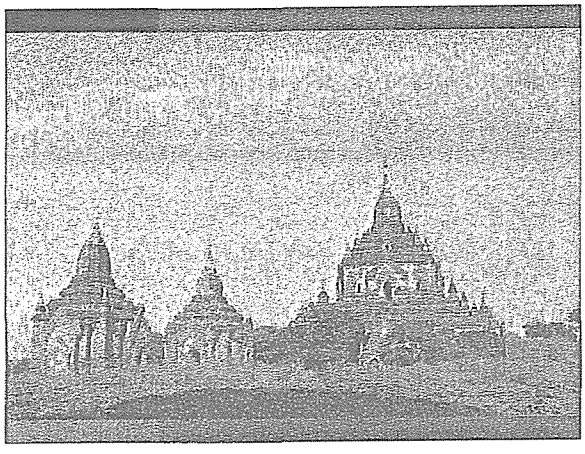


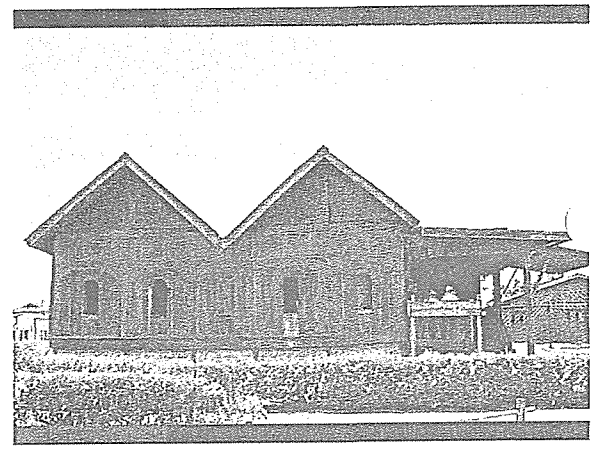


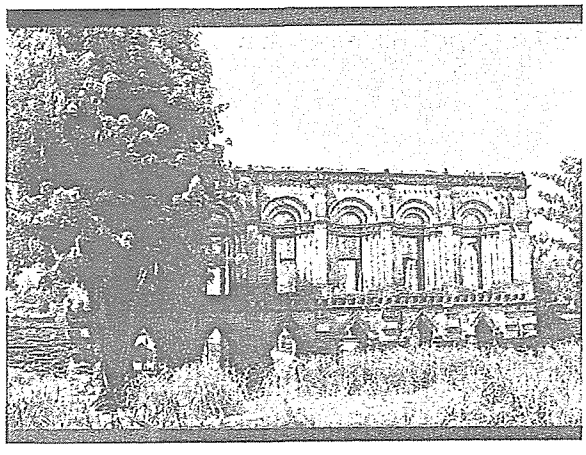


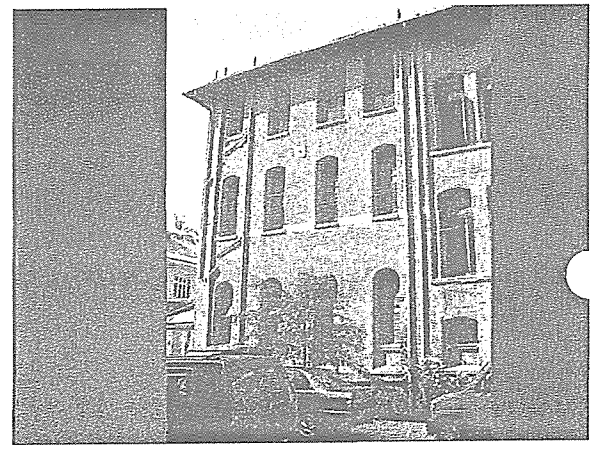


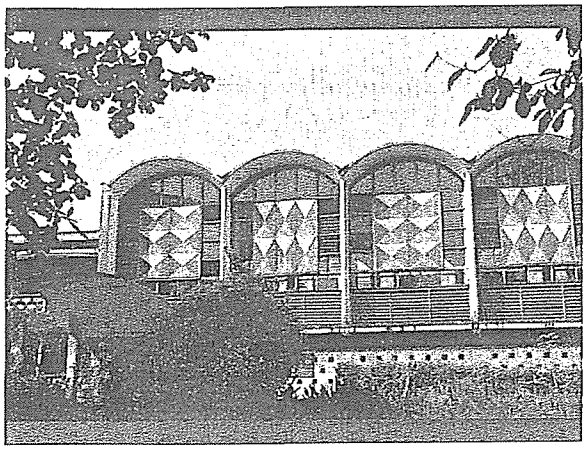


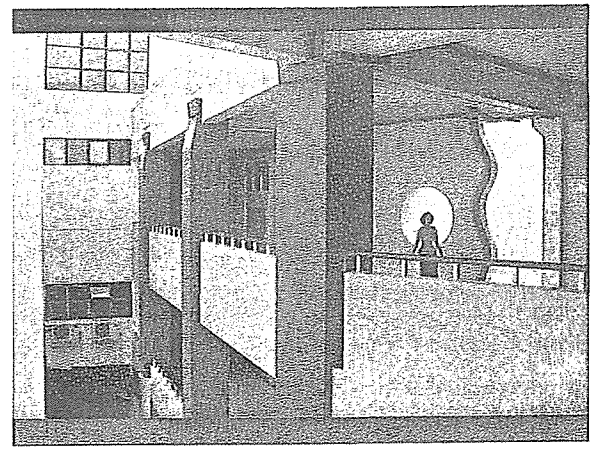












Wooden Architecture in Myanmar

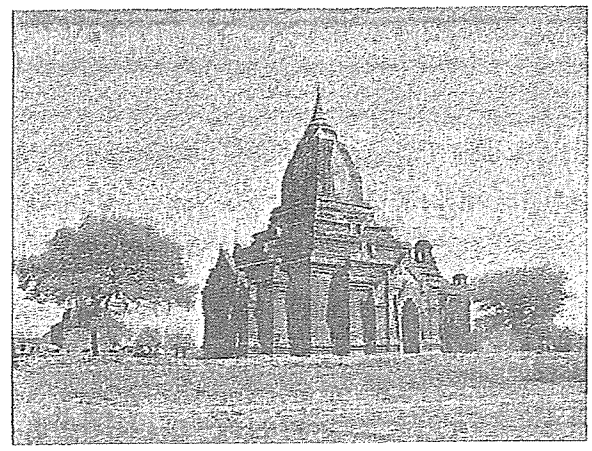
Types of architecture (classification according to materials used)

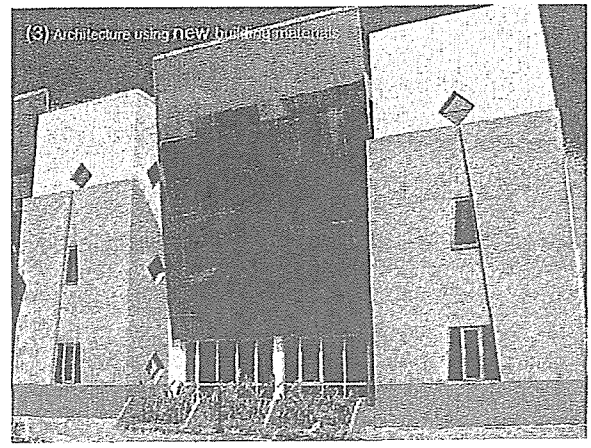
(1) Brick architecture

(2) Wooden architecture

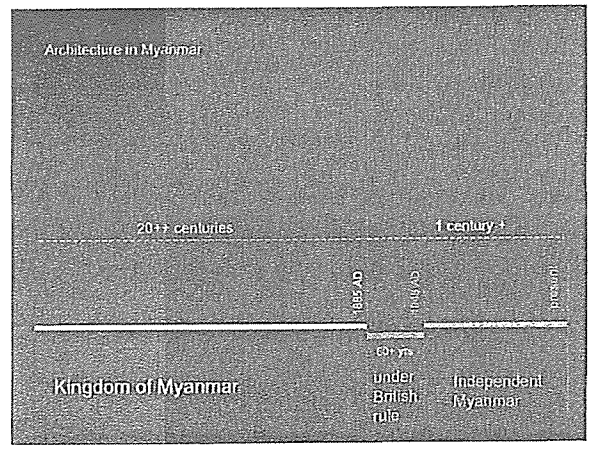
(3) Architecture using new building materials

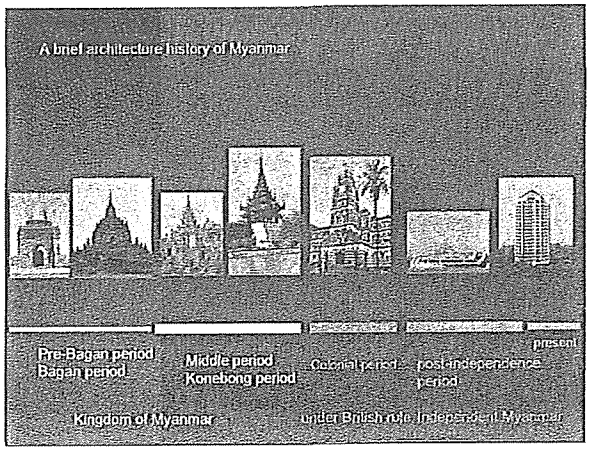
Modern architecture + +

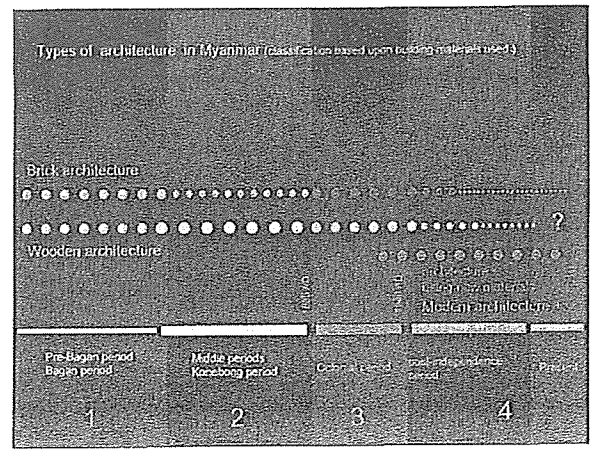


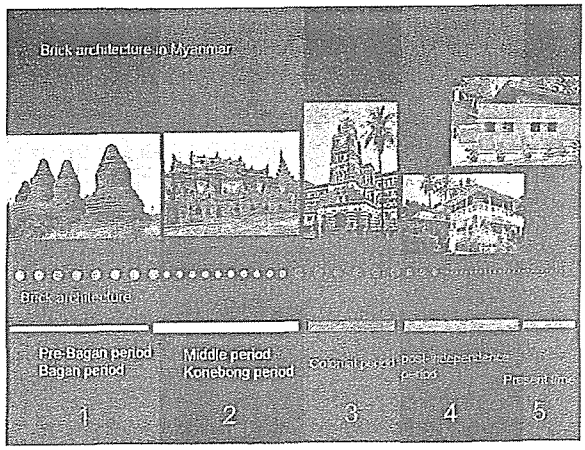


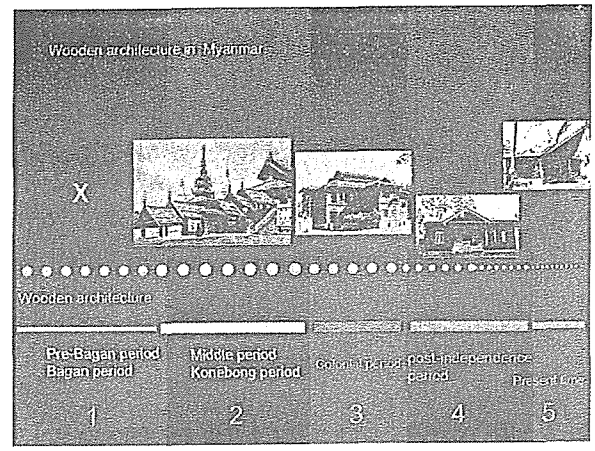
a brief history
of
architecture in Myanmar








Brick architecture in Myanmar
Brick architecture
Pre-Bagan period
Bagan period
Middle period
Konebong period
Present time
1
2
3
4
5


Wooden architecture in Myanmar
X
Wooden architecture
Pre-Bagan period
Bagan period
Middle period
Konebong period
1
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3
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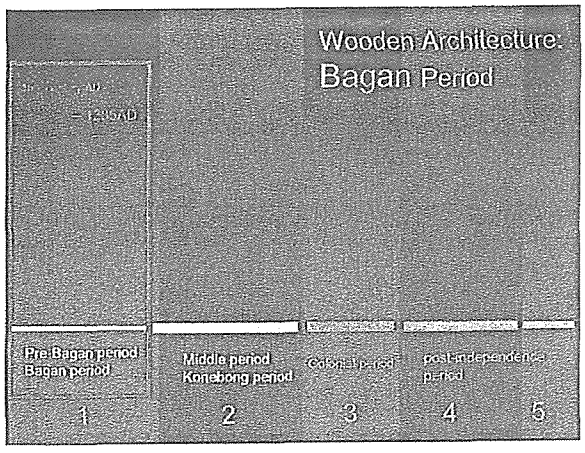
Wooden Architecture:
Bagan Period
Pre-Bagan period
Bagan period
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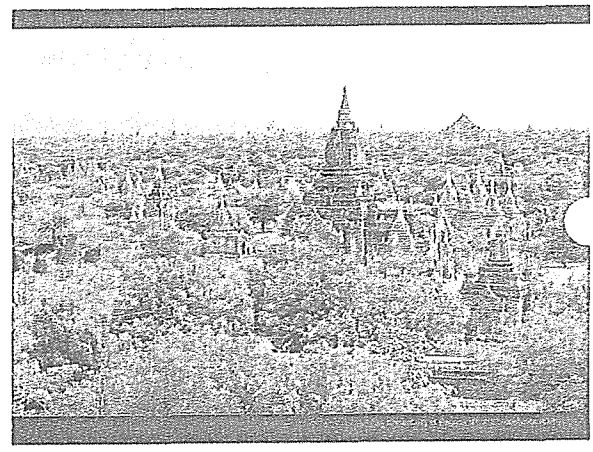
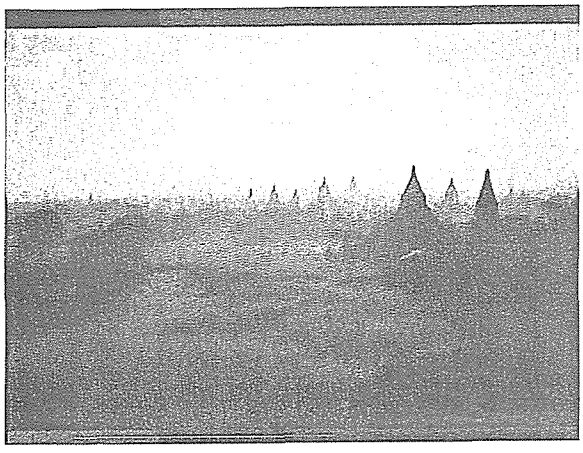
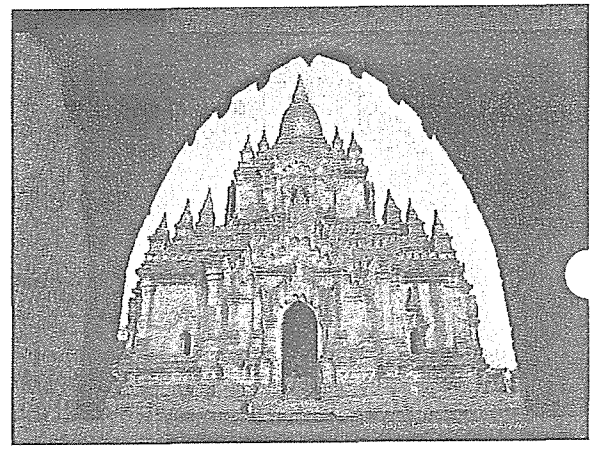
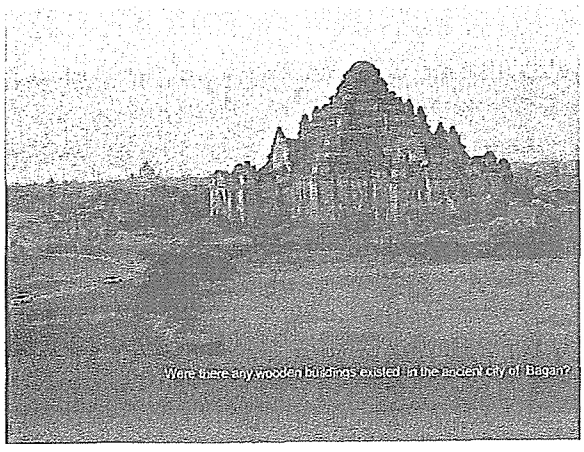
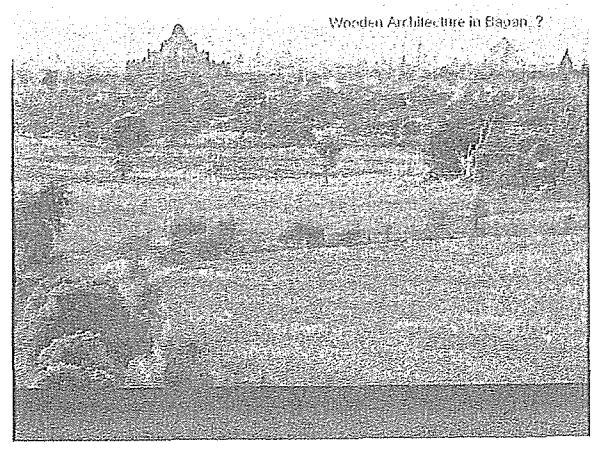






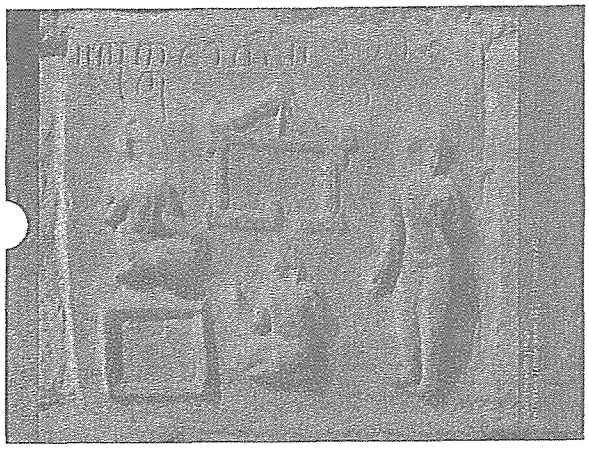

Were there any wooden buildings existed in the ancient city of Bagan?

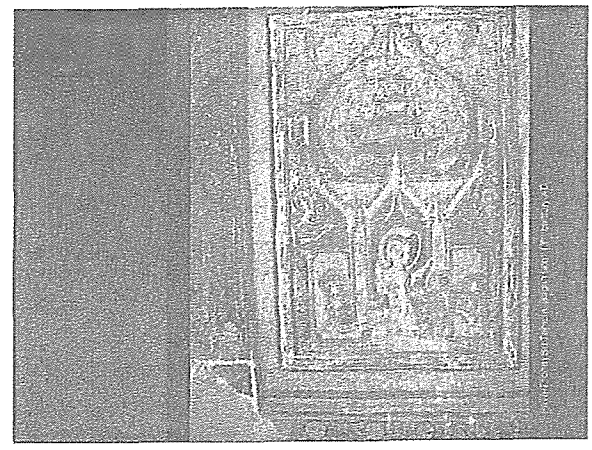

Wooden Architecture in Bagan ?

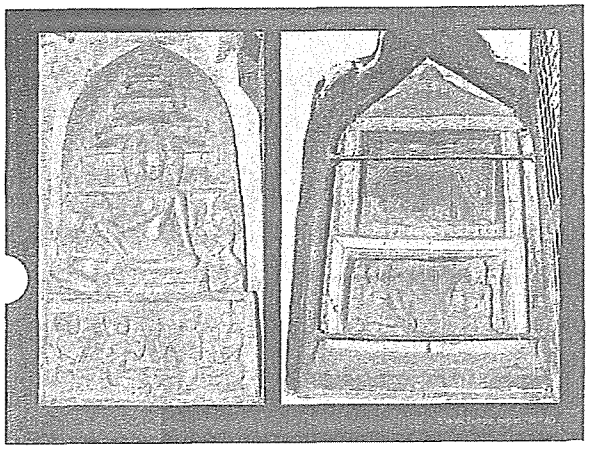
Wooden structures:

X

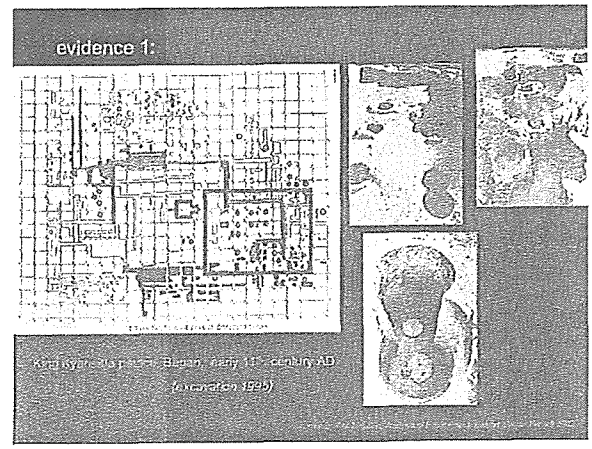
none of the wooden structures of early period and Bagan period were survived

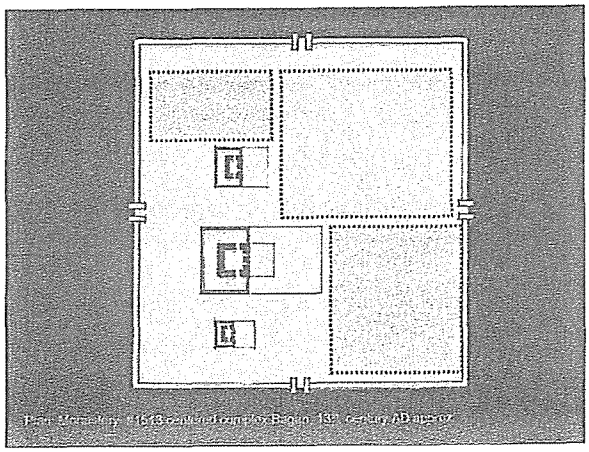




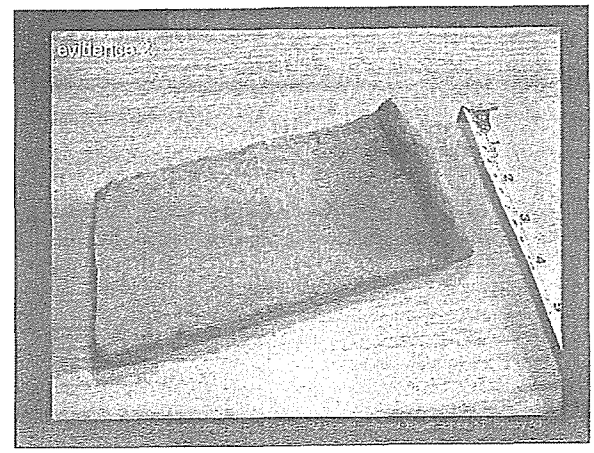


evidence 1:



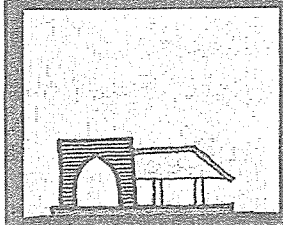


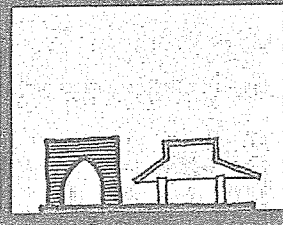
evidence 2:

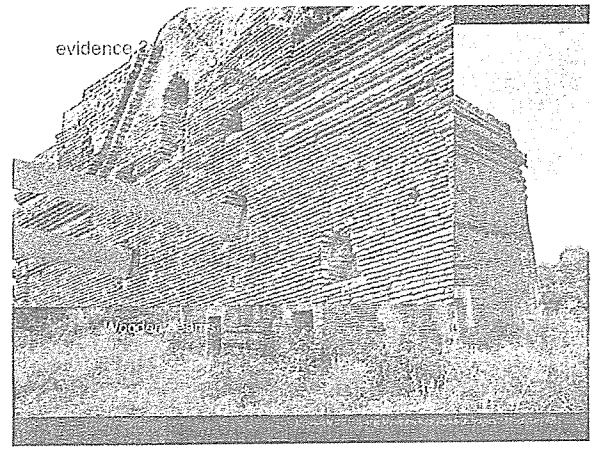


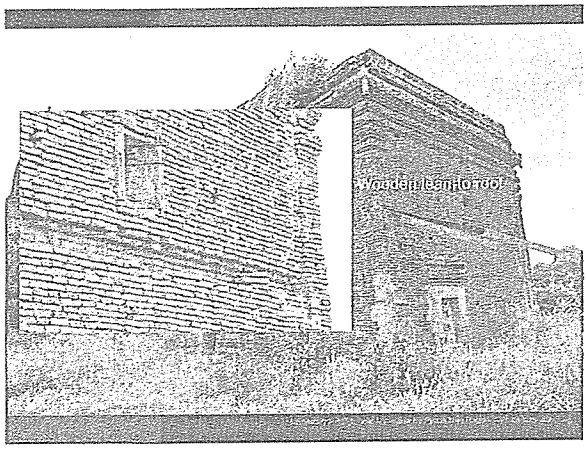
Wooden architecture: Bagan Period

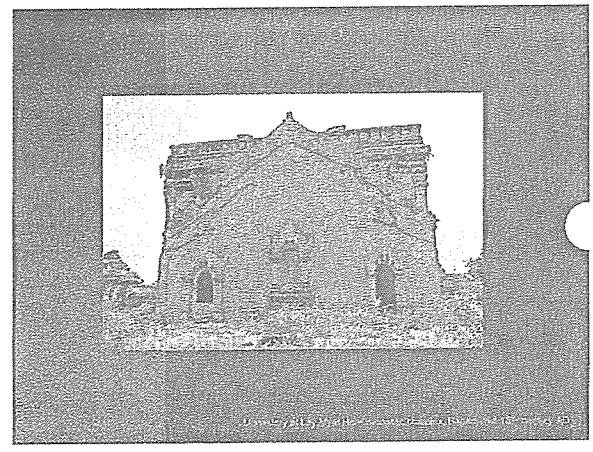
Composite structures: combination of brick structure and wooden structure

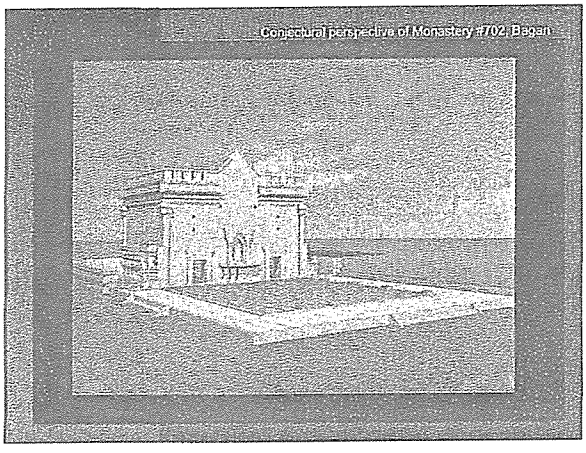


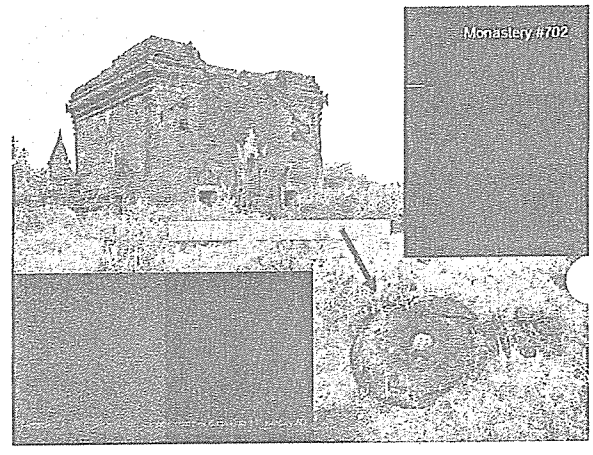


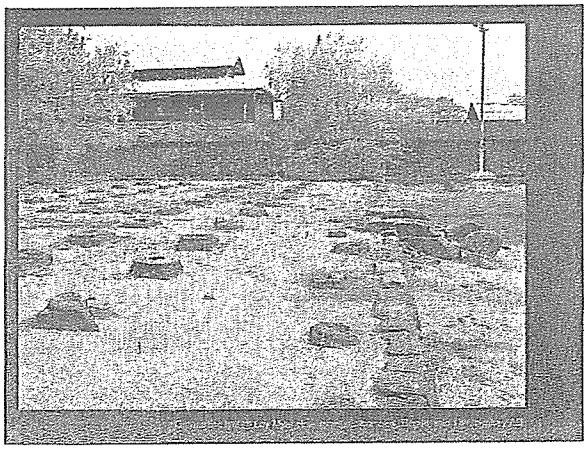


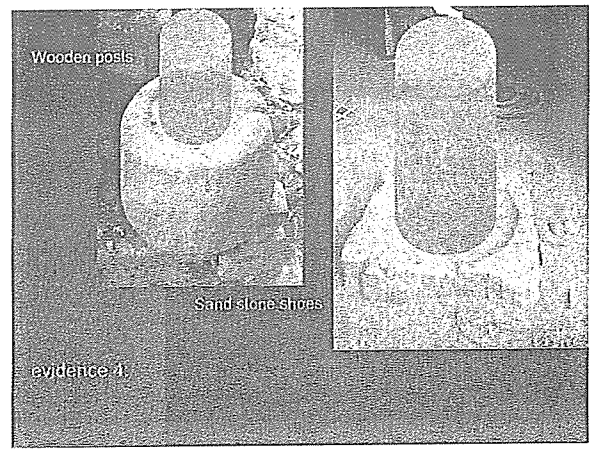


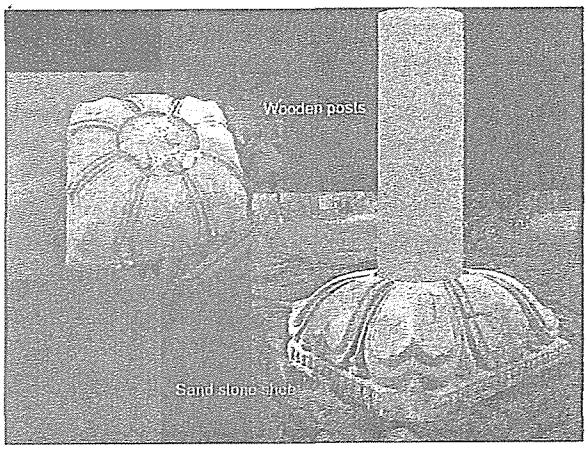


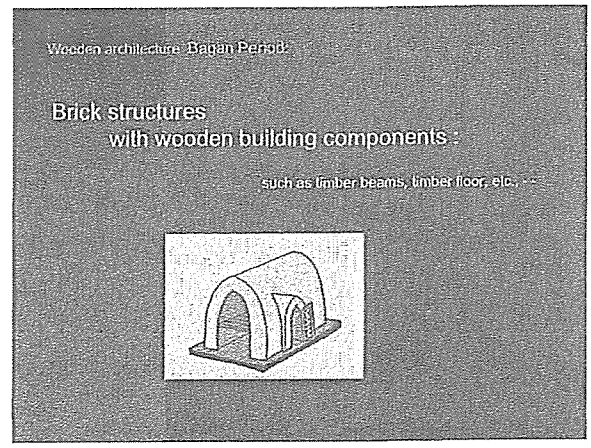


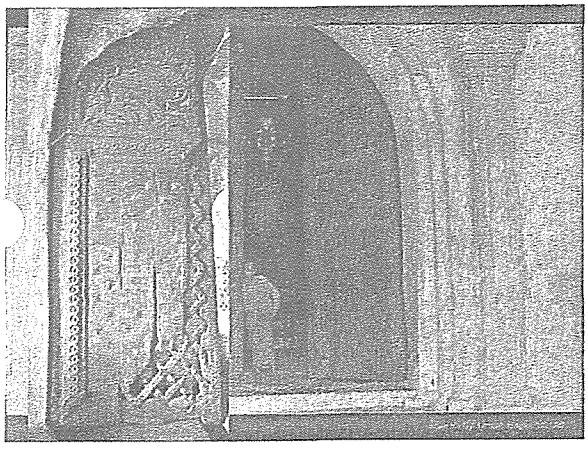


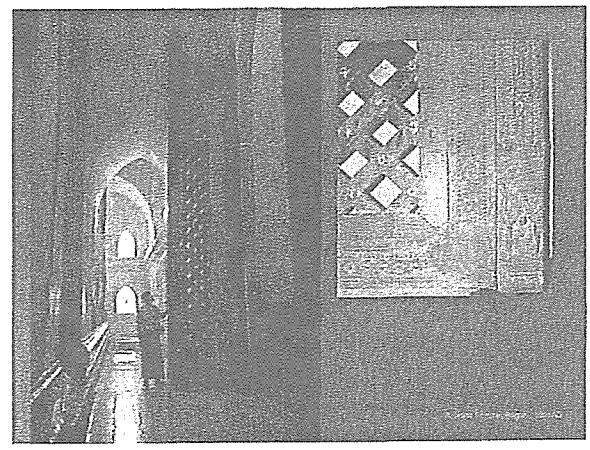


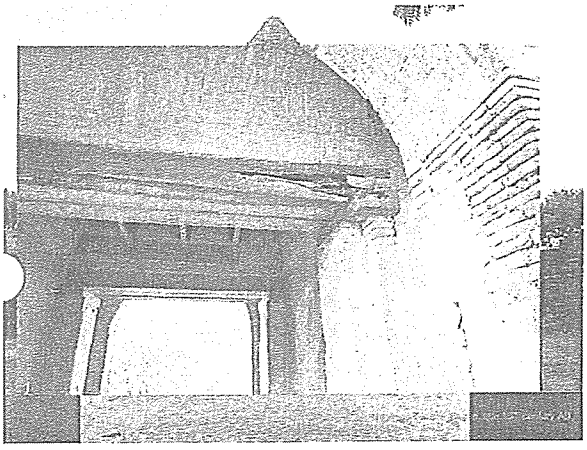


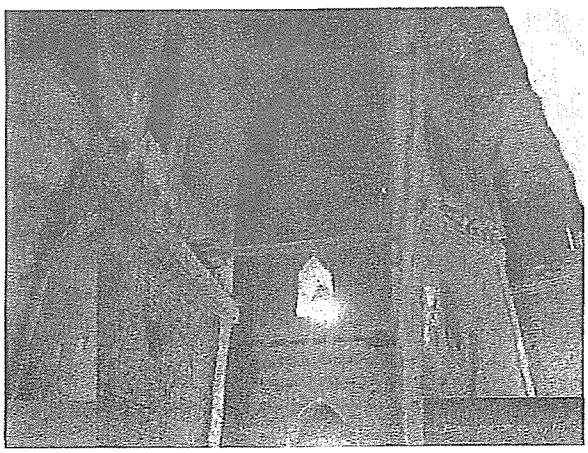

Wooden posts
Sand stone slab

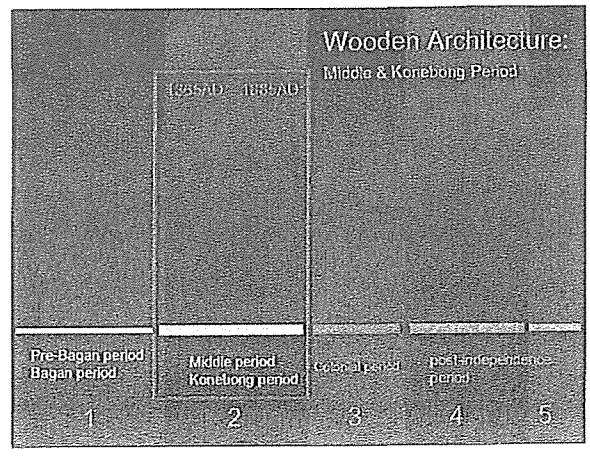

Wooden architecture: Bagan Period:
Brick structures
with wooden building components :
such as timber beams, timber floor, etc. ...










Wooden Architecture:
Middle & Konebong Period
1235AD - 1885AD
Pre-Bagan period
Bagan period
Middle period
Konebong period
colonial period
post-independence
period
1
2
3
4
5

Wooden architecture Middle & Konebong Period:

types of buildings . . . . (according to its function)

Religious buildings

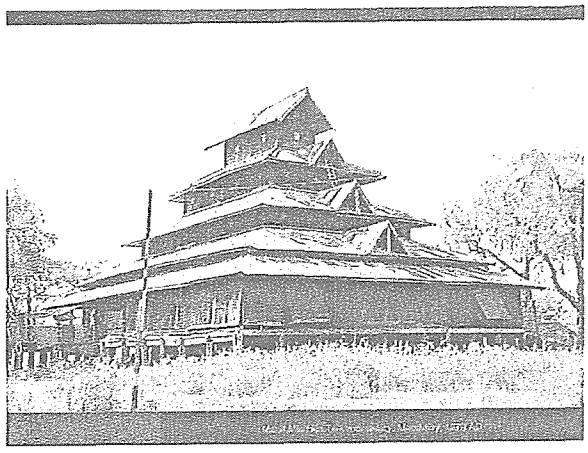
Residences - Palaces, Houses

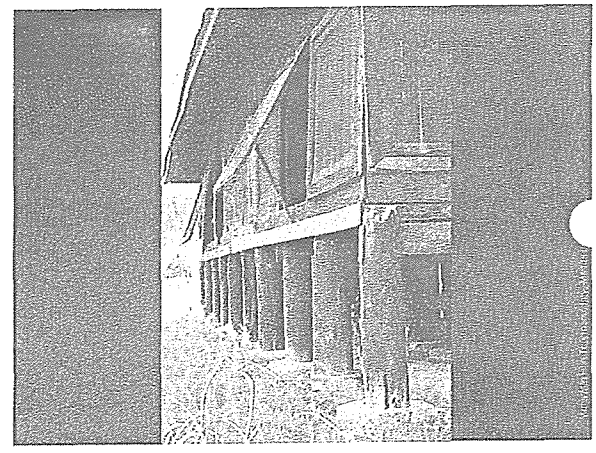
Public buildings

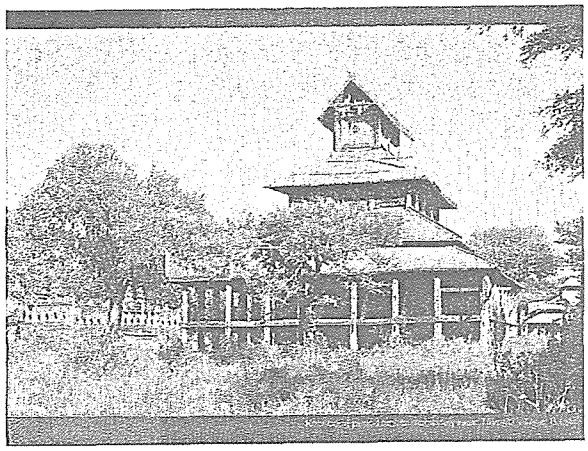
Wooden architecture Middle & Konebong Period:

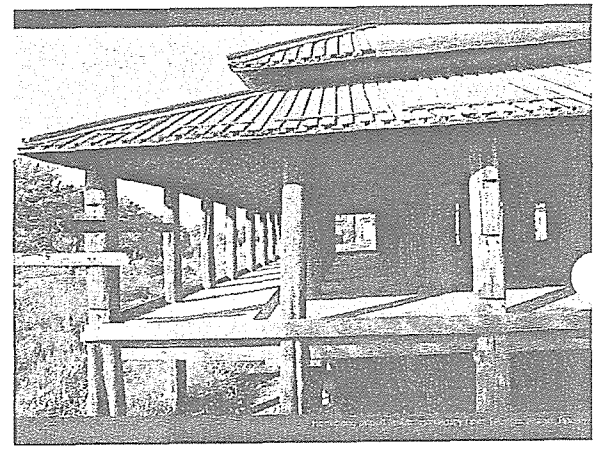
Religious buildings

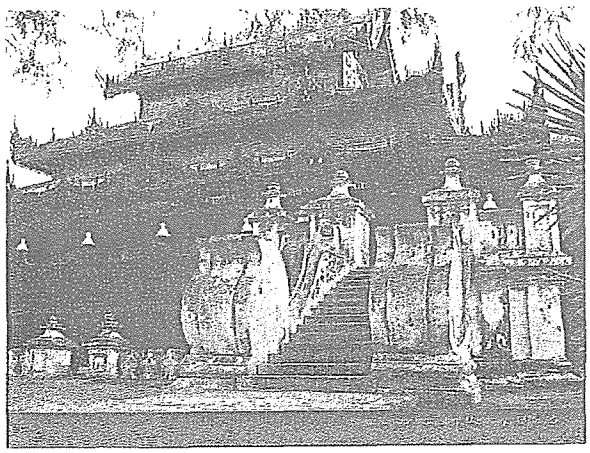
Wooden Monasteries . . .

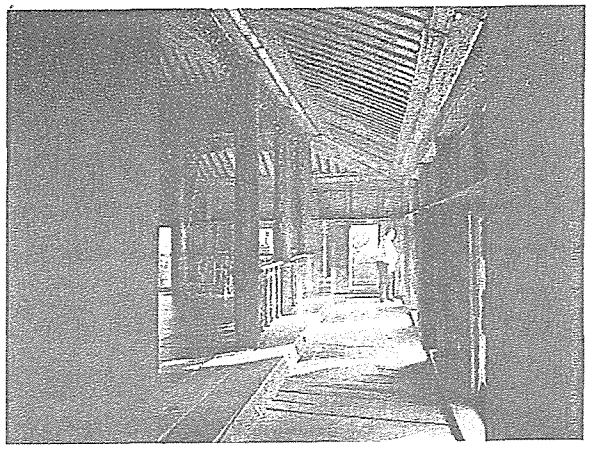


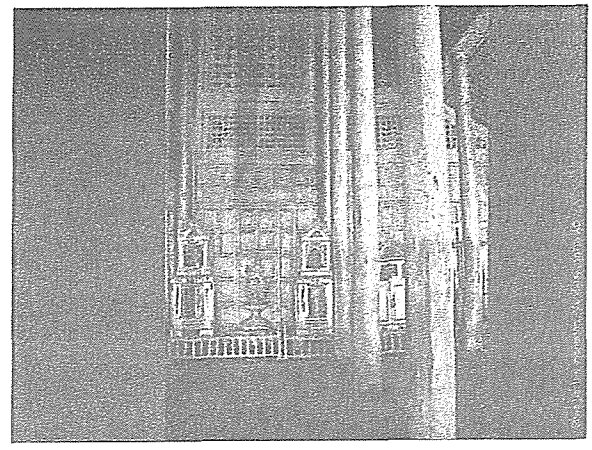


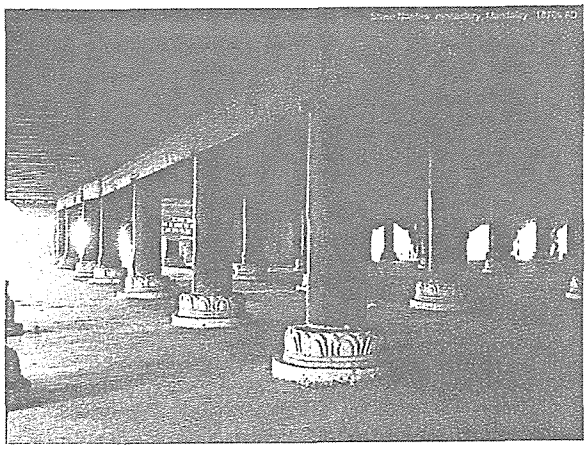


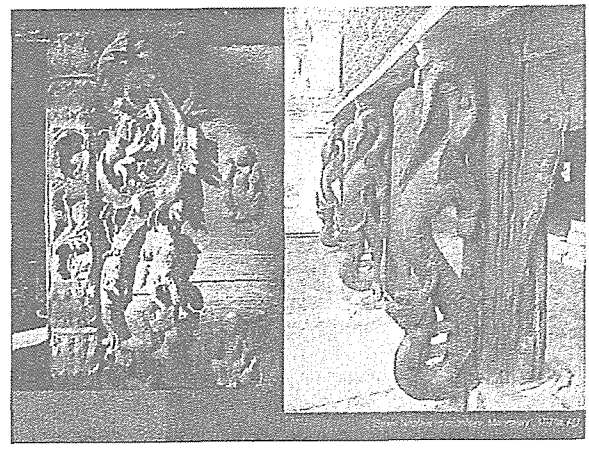


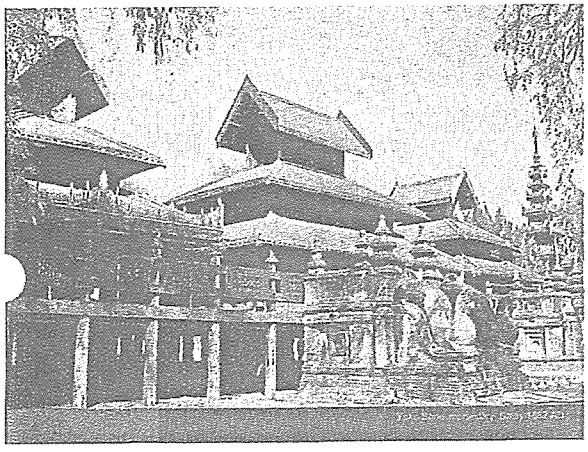


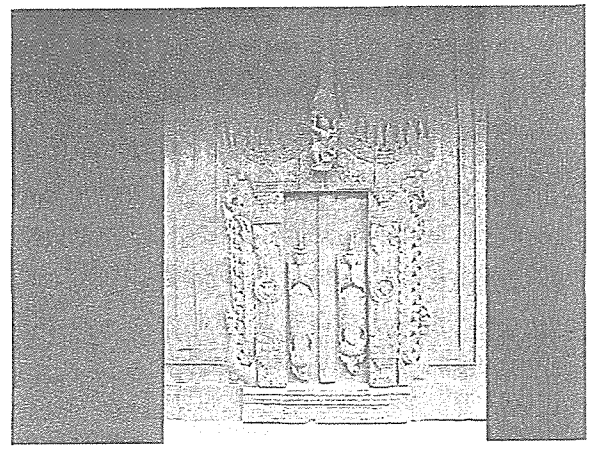


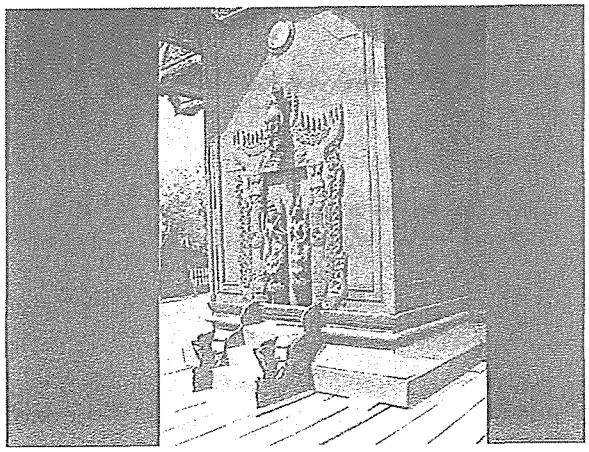


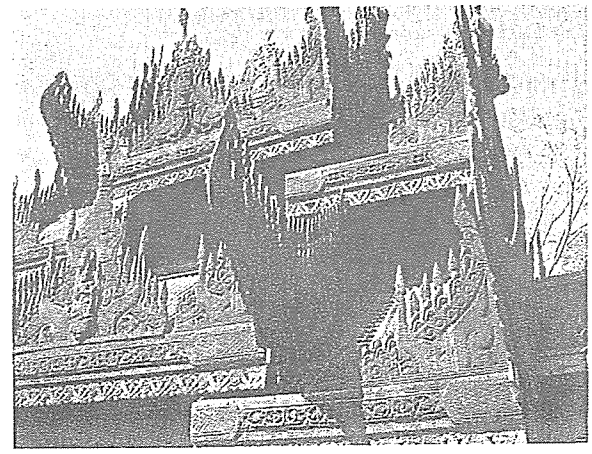


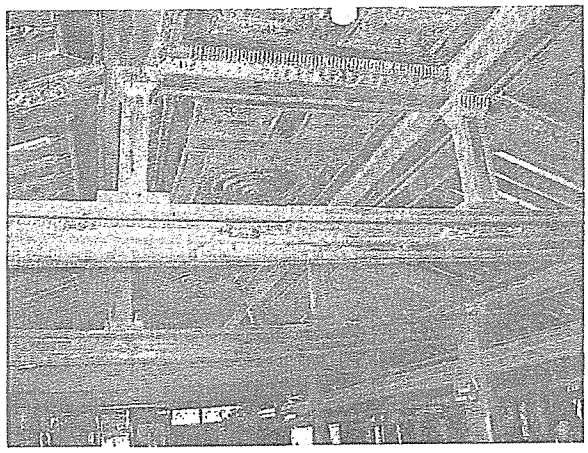


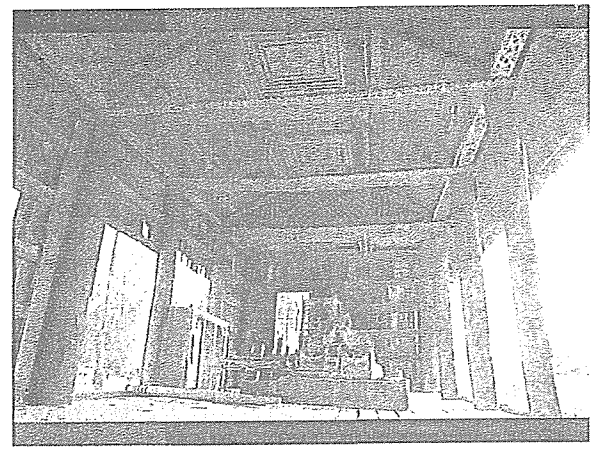


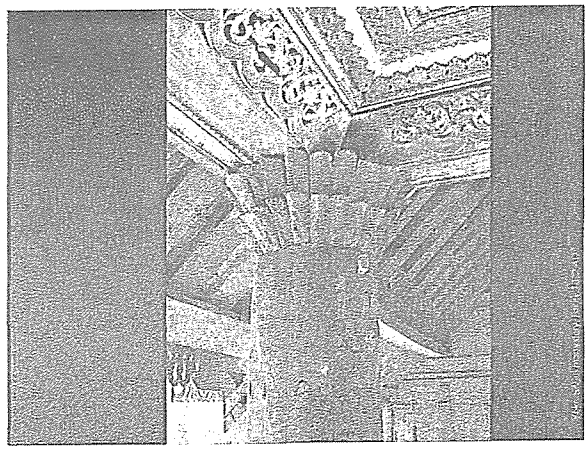


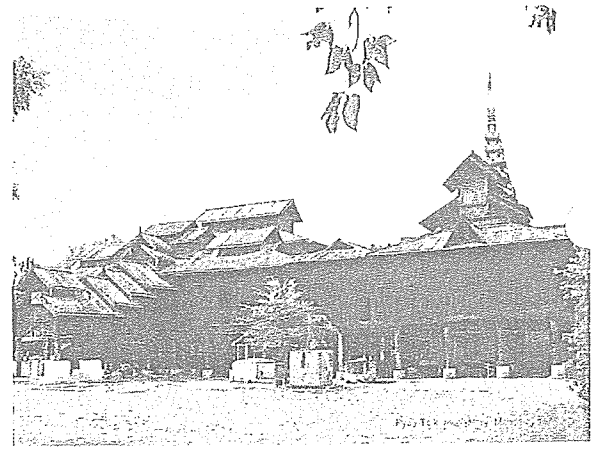


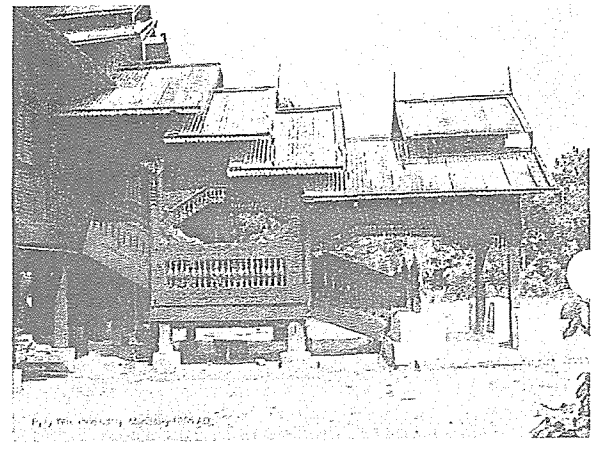


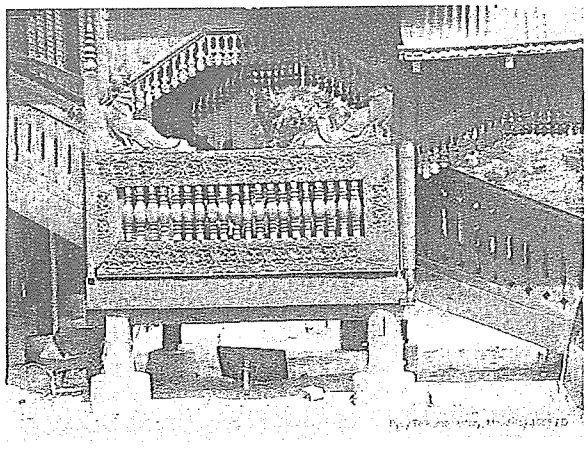


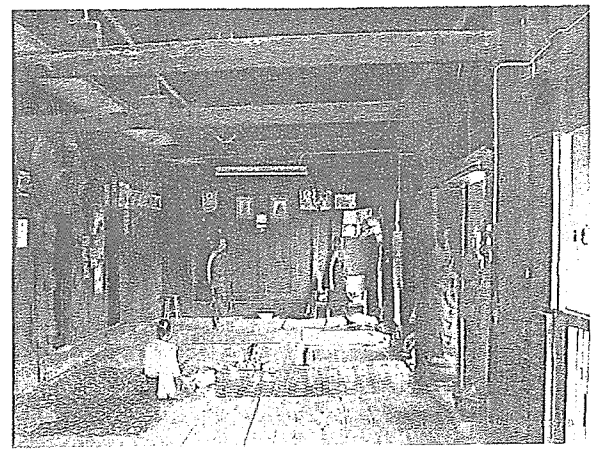


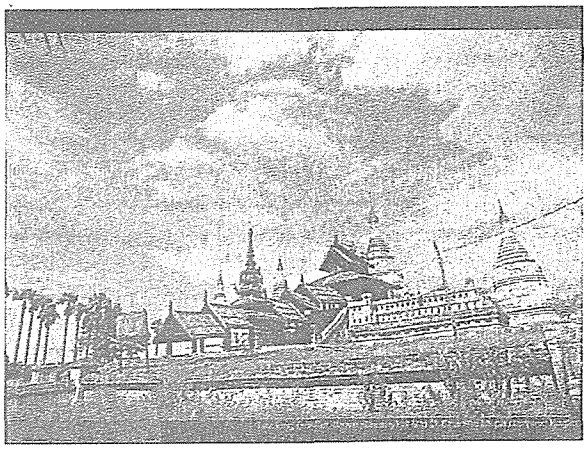


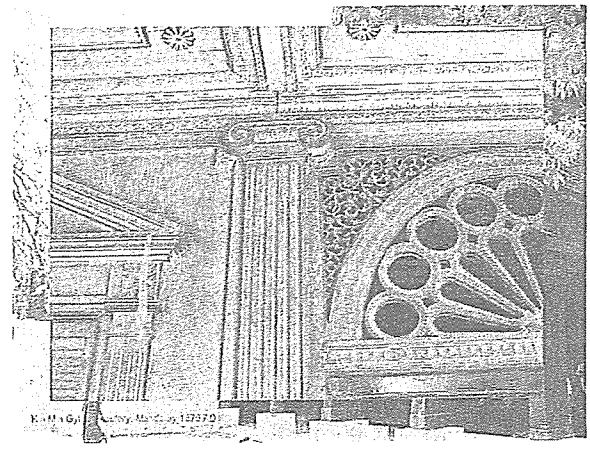


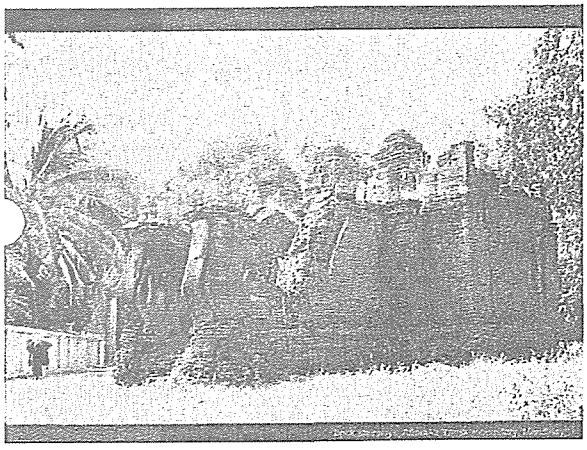






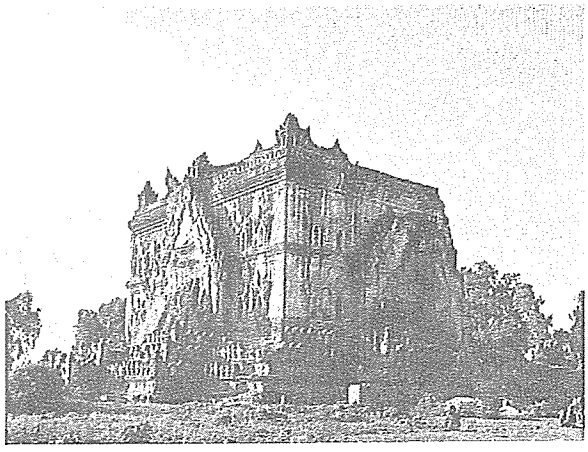


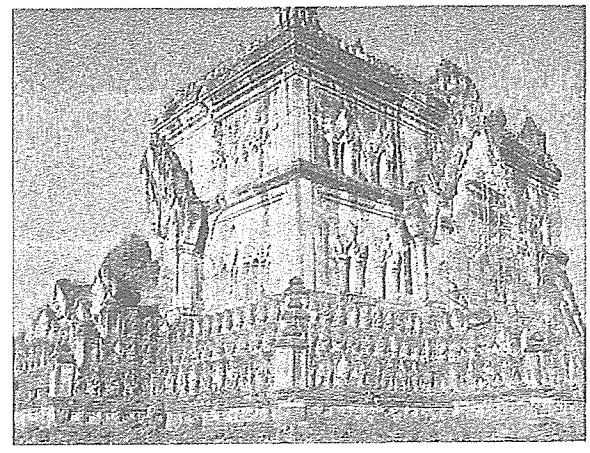


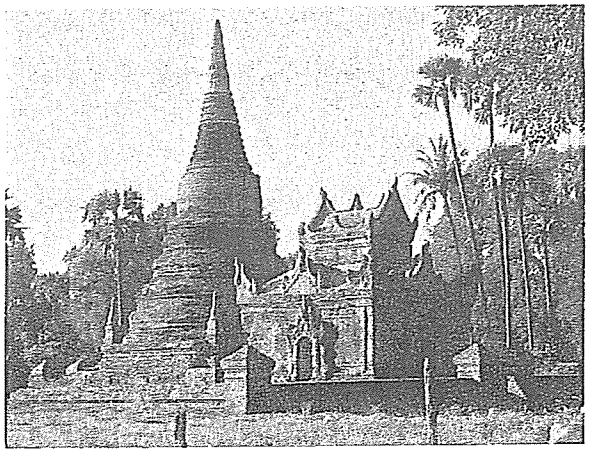


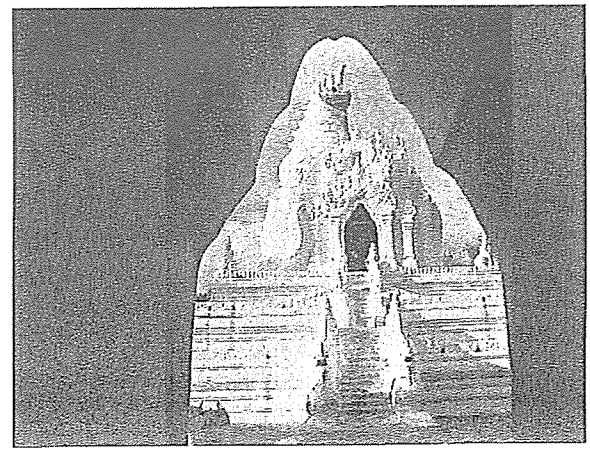
Wooden architecture: Middle & Konebong Period:

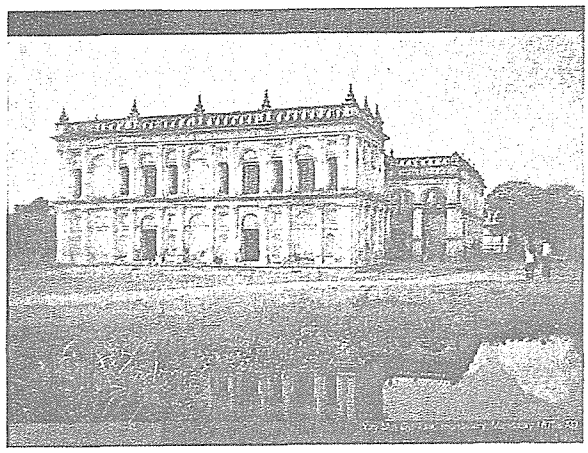
Brick architecture





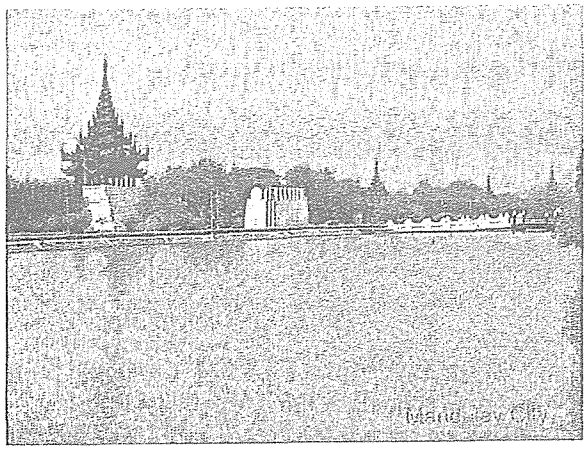


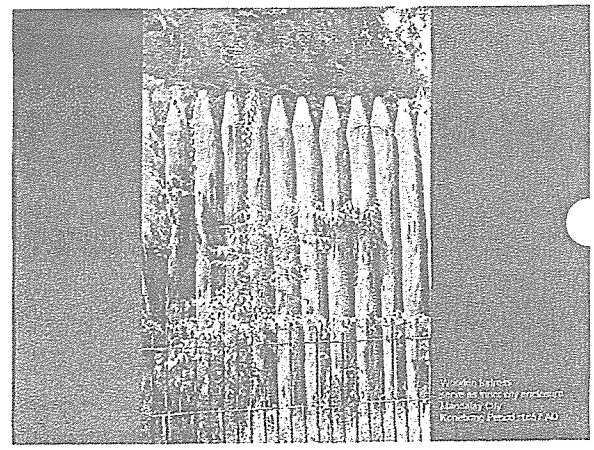


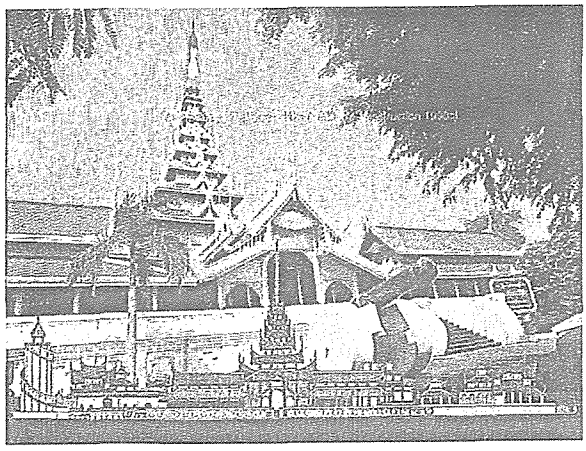


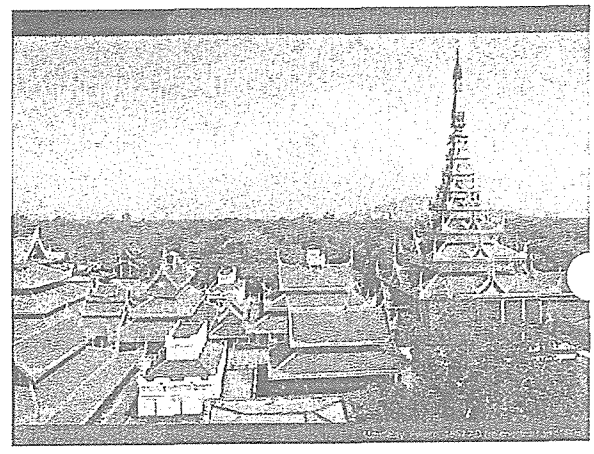
Wooden architecture Middle & Konebong Period:

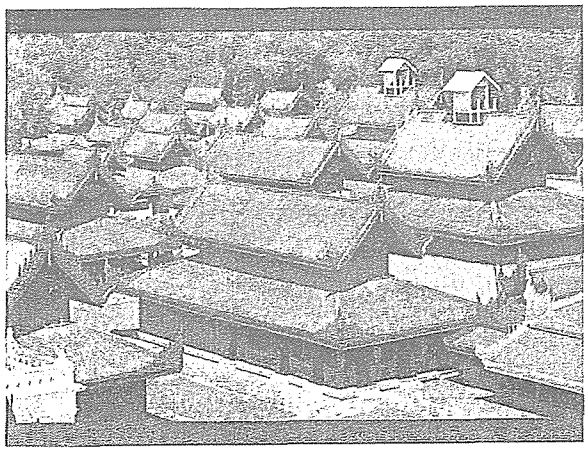
Wooden Palaces . . .

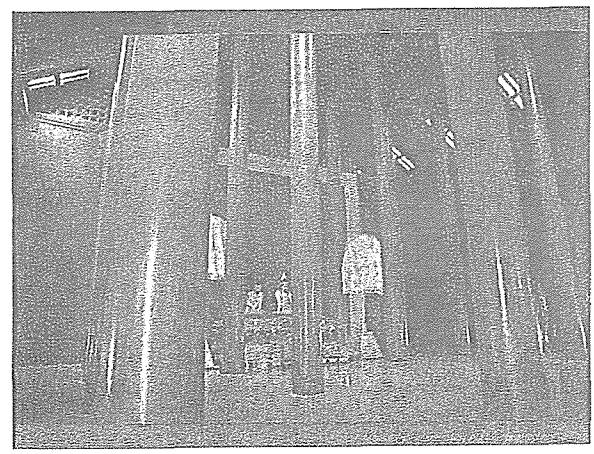


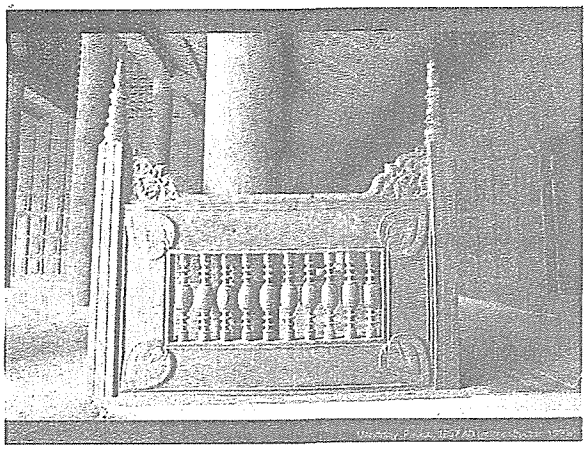


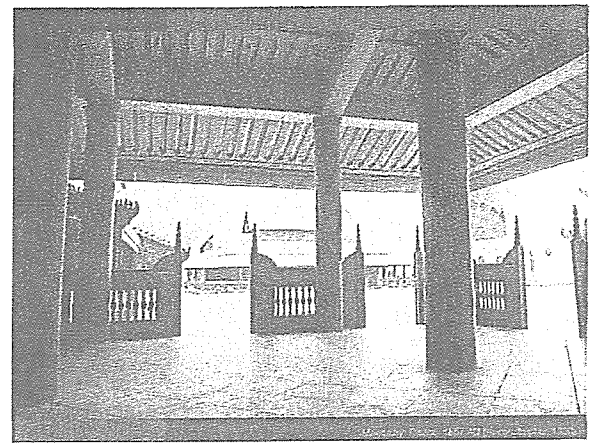


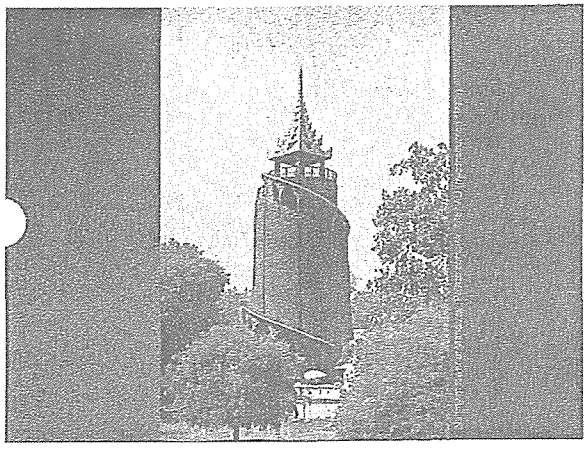


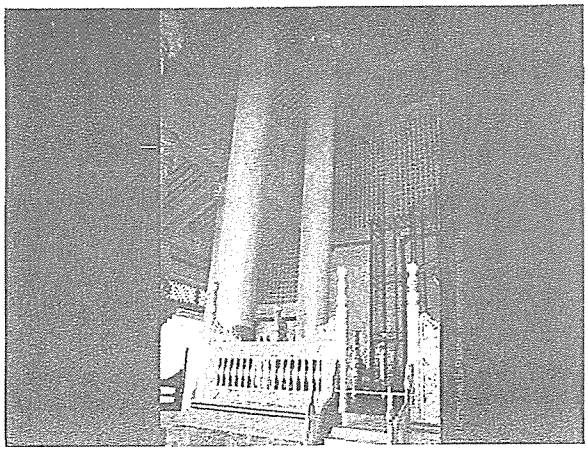


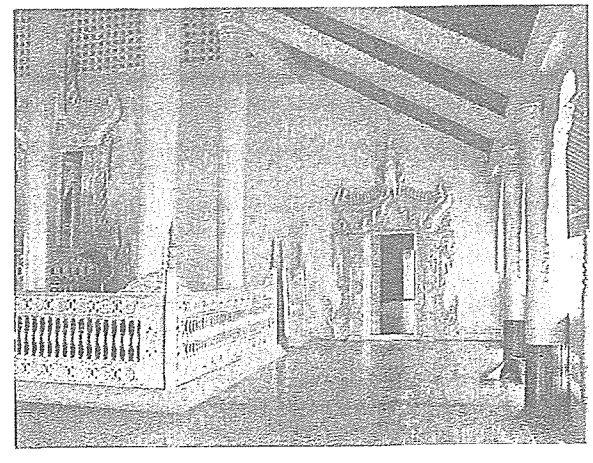






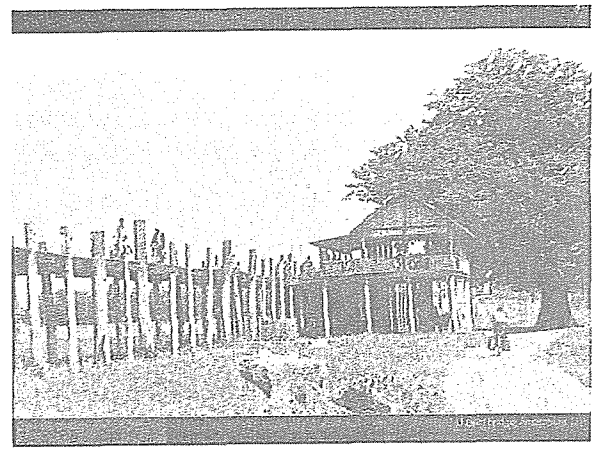


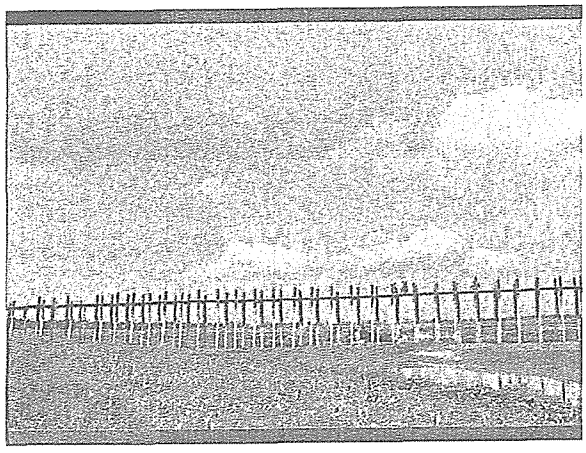


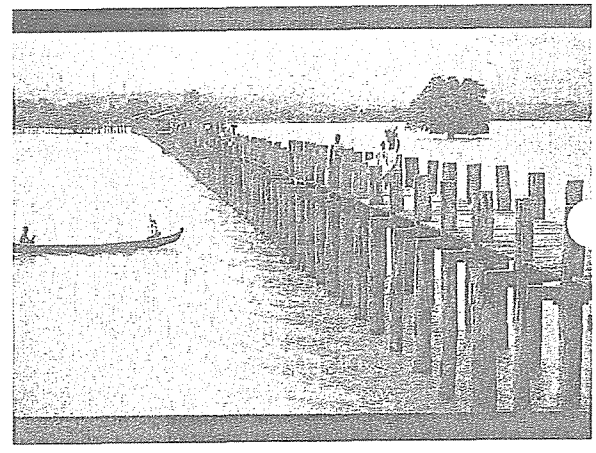


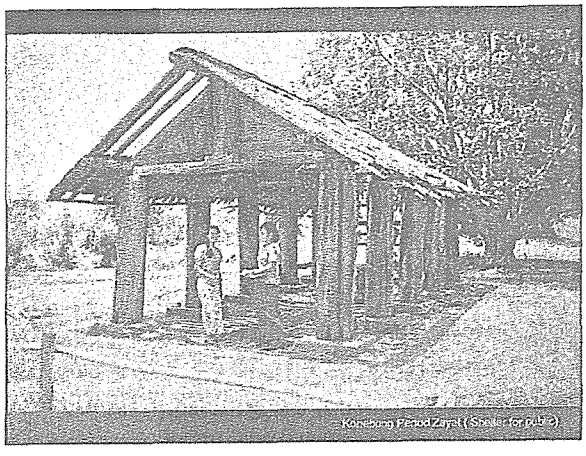
Wooden architecture: Middle & Konebong Period:

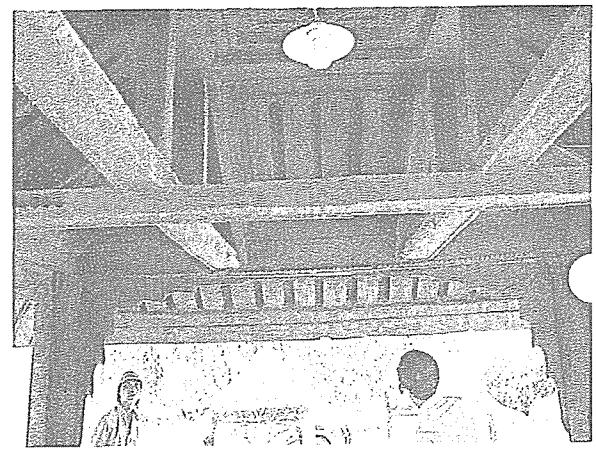
Wooden structures for public use . . .

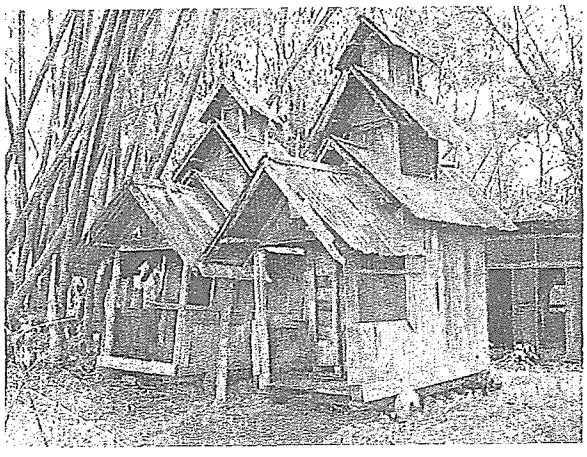






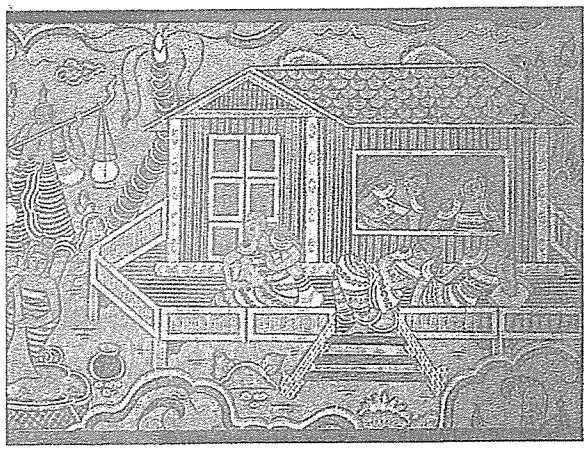


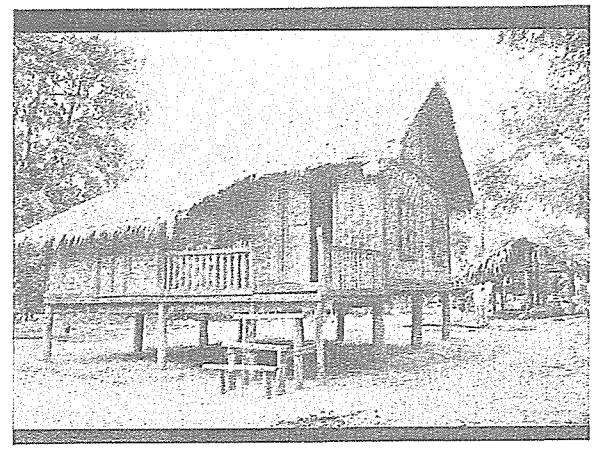


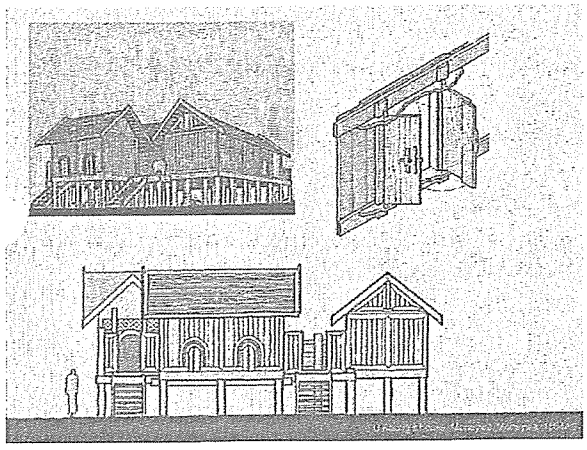


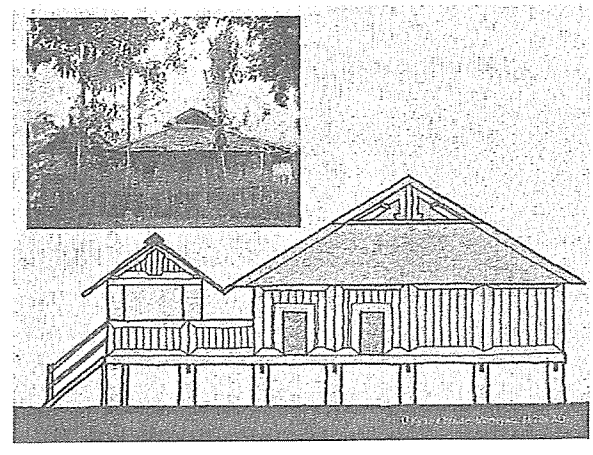
Wooden architecture: Middle & Konebong Period:

Wooden houses . . .





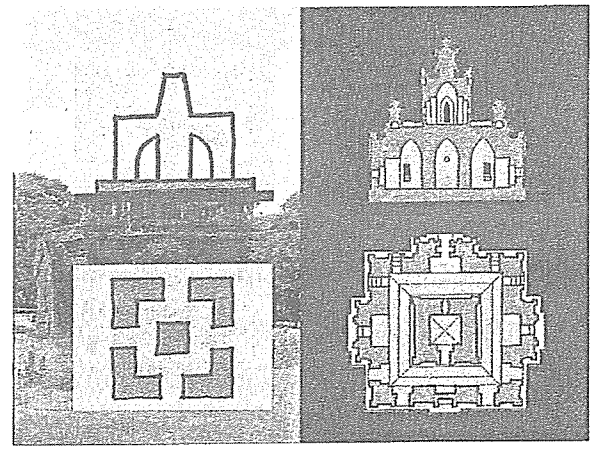


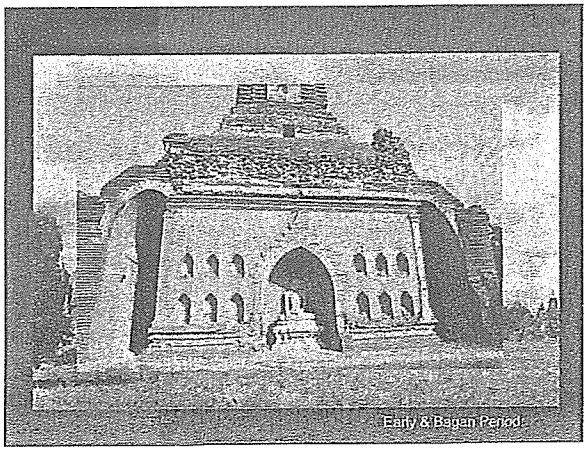


Wooden architecture Middle & Konebong Period:

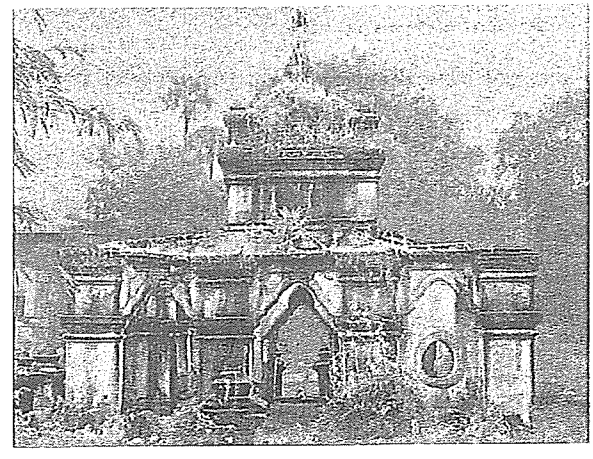
from BRICK
to WOOD

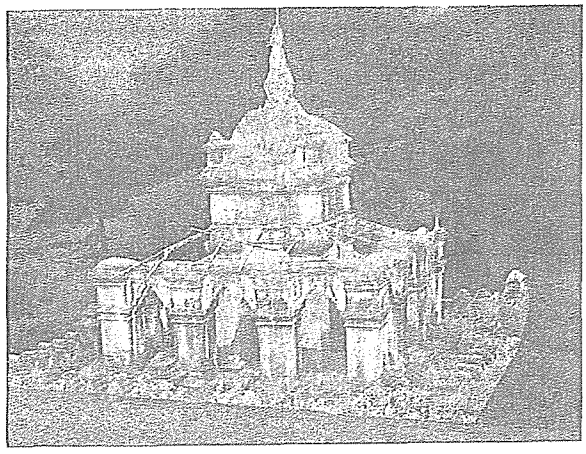
-same form & function
-different structural system

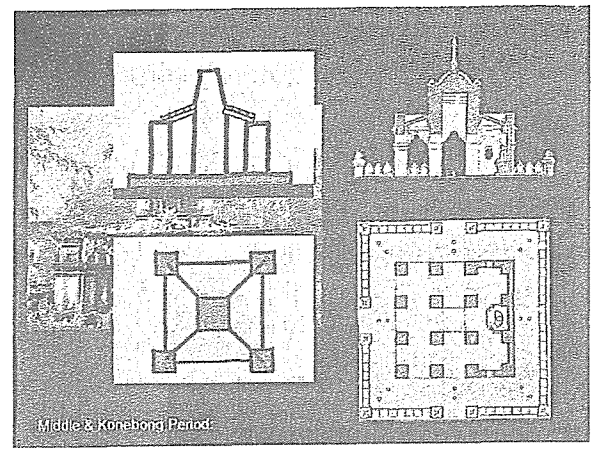




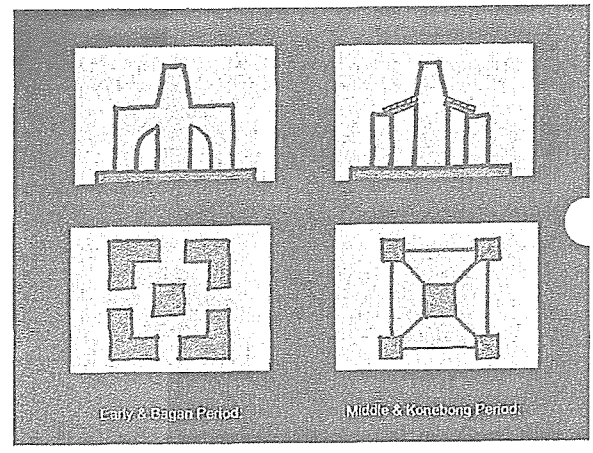
Early & Bagan Period

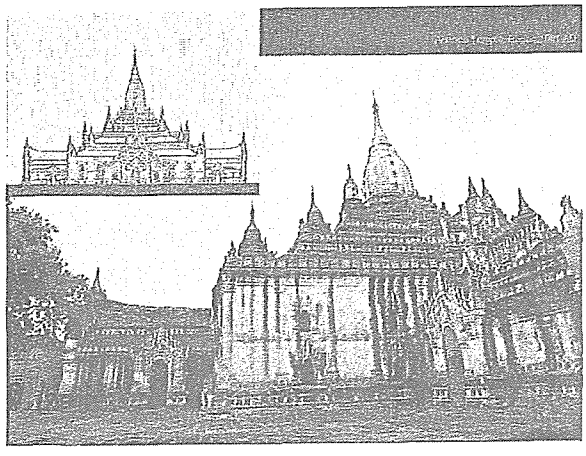


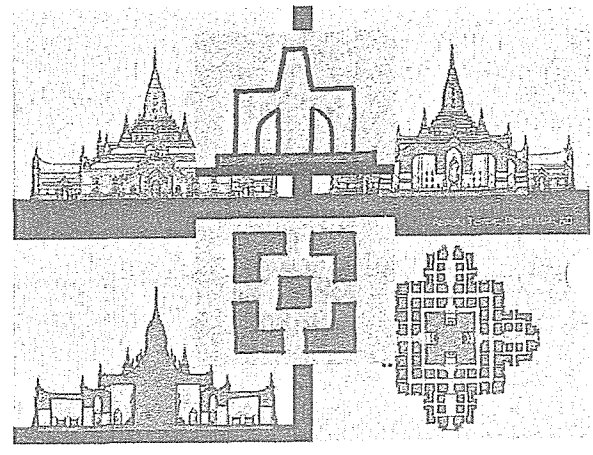


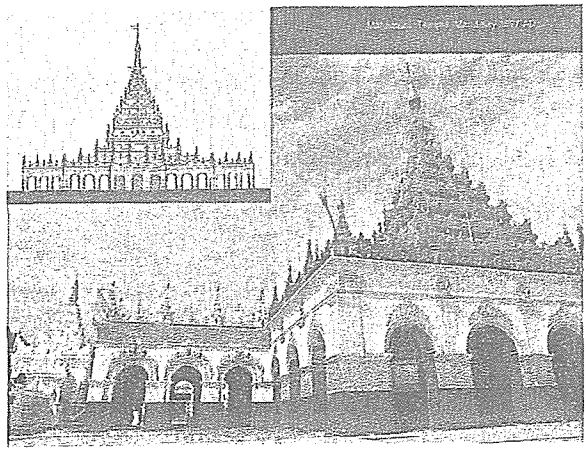

Middle & Konebong Period

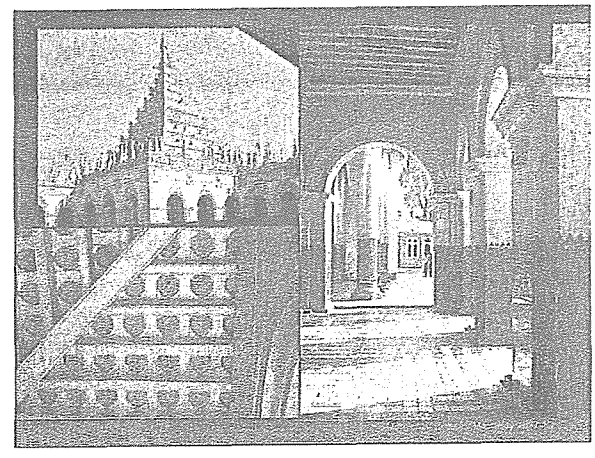

Middle & Konebong Period

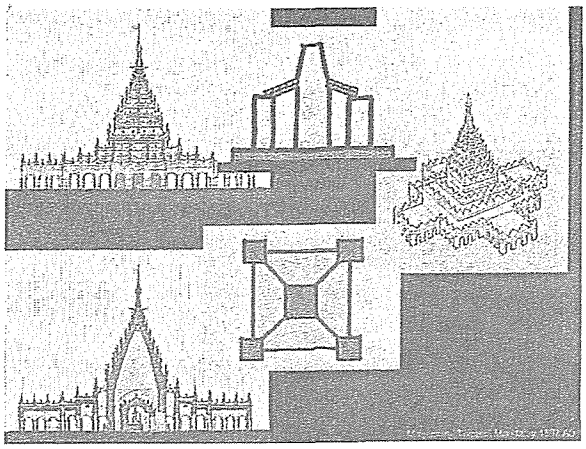

Early & Bagan Period
Middle & Konebong Period

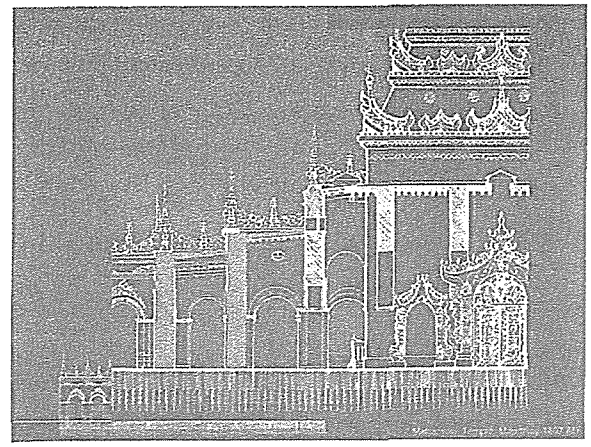




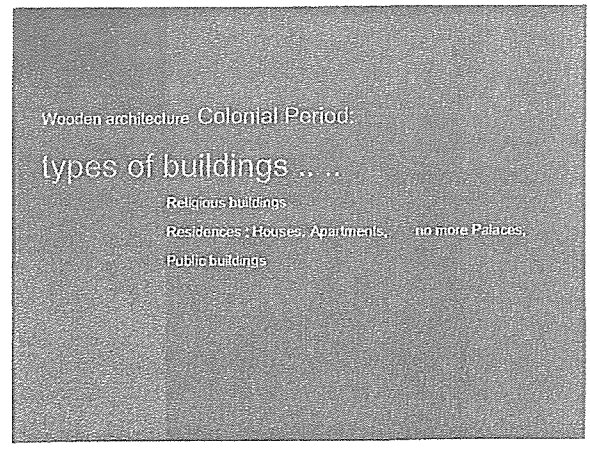


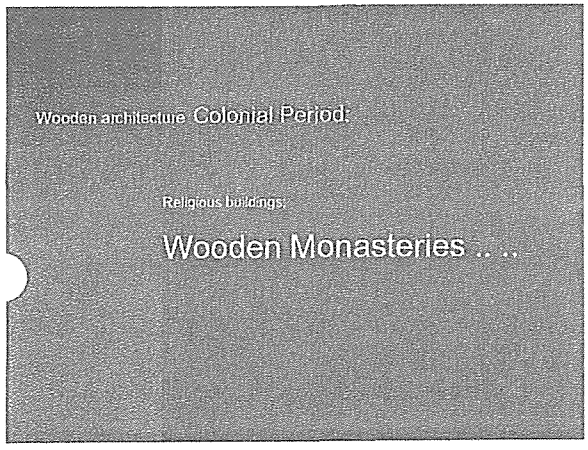


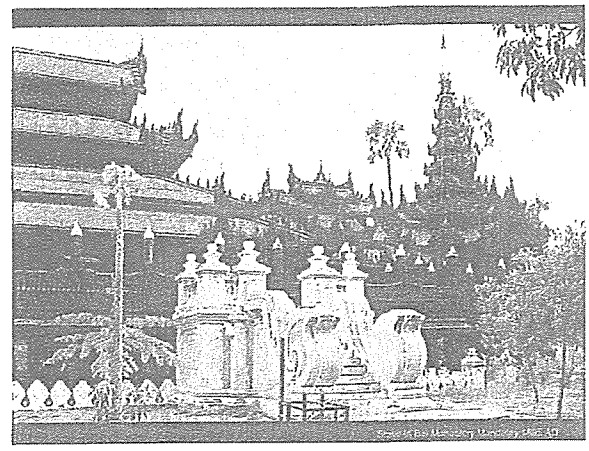


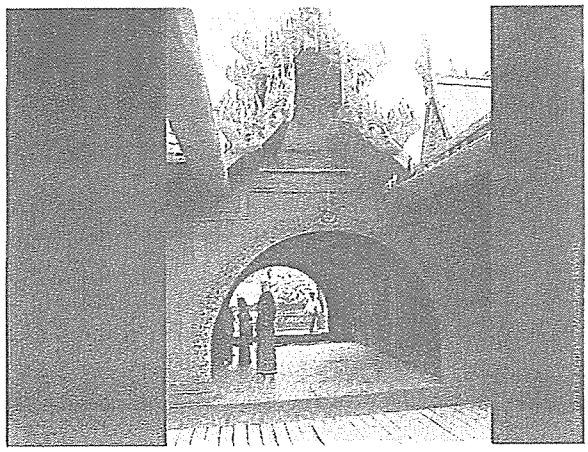


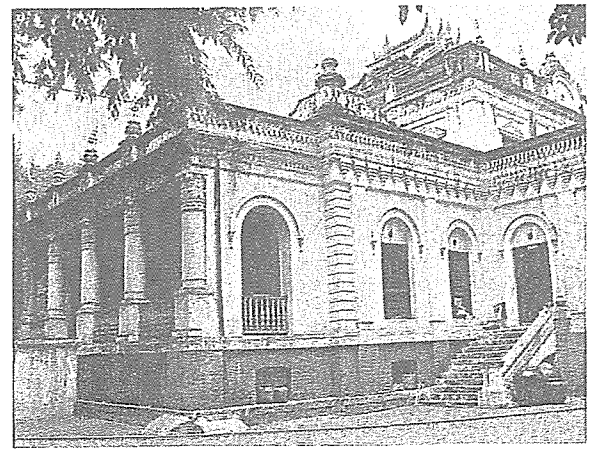

Wooden Architecture:
colonial Period
1885AD - 1948AD
Pre-Bagan period
Bagan period
Middle period
Konebong period
post-independence
period
1
2
3
4
5

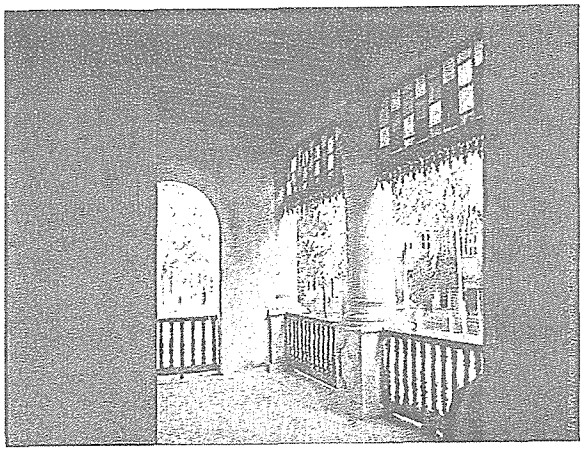

Wooden architecture Colonial Period:
types of buildings .. ..
Religious buildings
Residences : Houses, Apartments, no more Palaces,
Public buildings

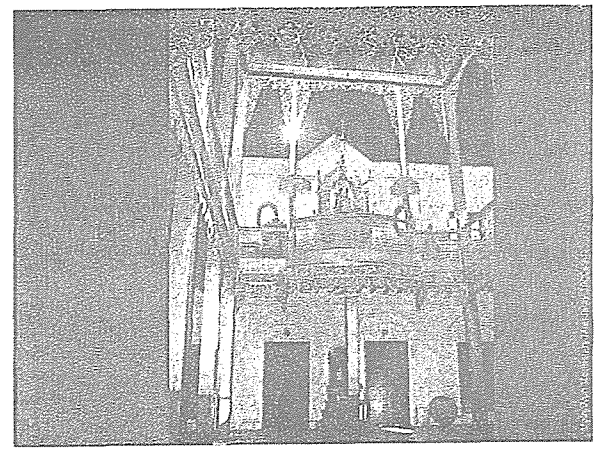

Wooden architecture Colonial Period:
Religious buildings
Wooden Monasteries .. ..









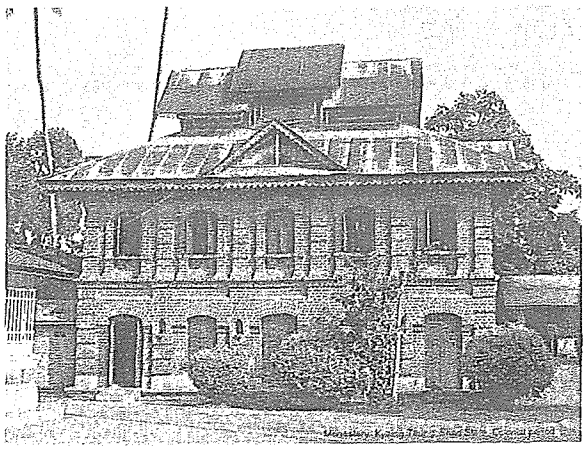


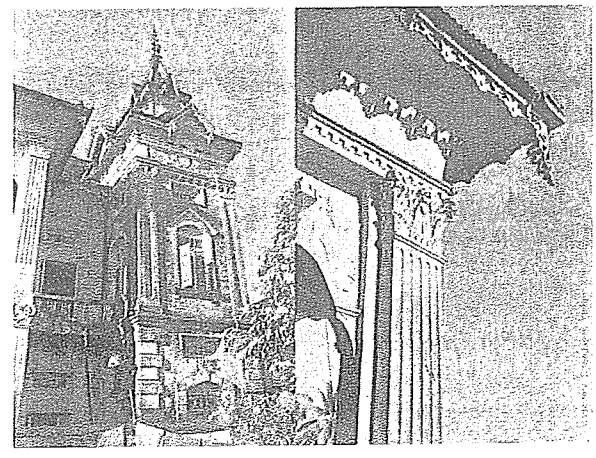
Wooden architecture: Colonial Period:

Religious buildings:

Brick Monasteries

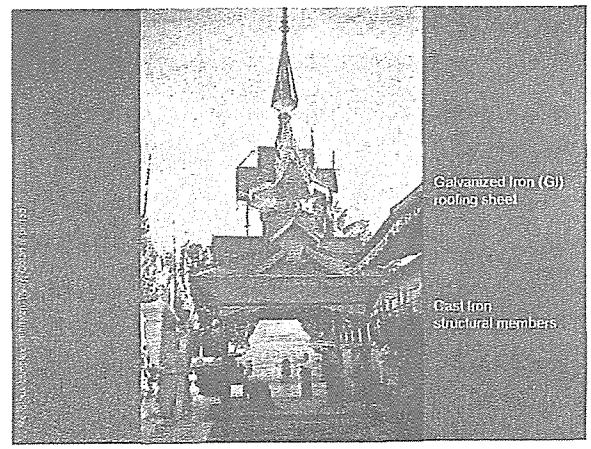
with timber framed roofs . . . .

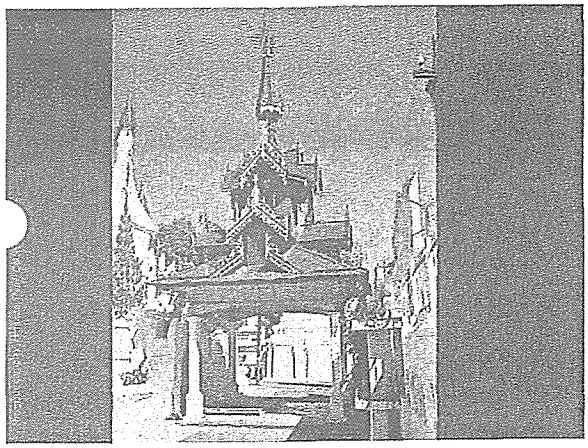


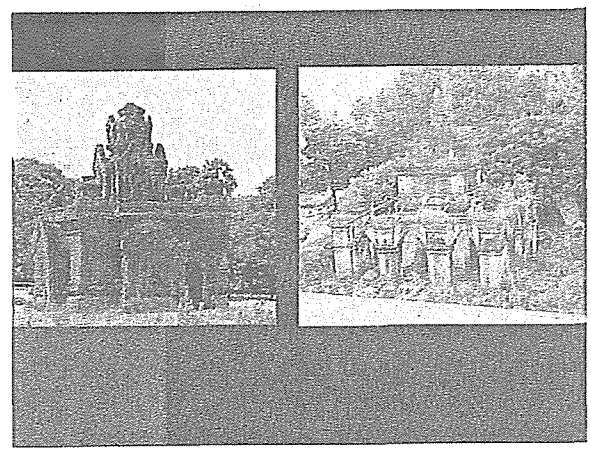


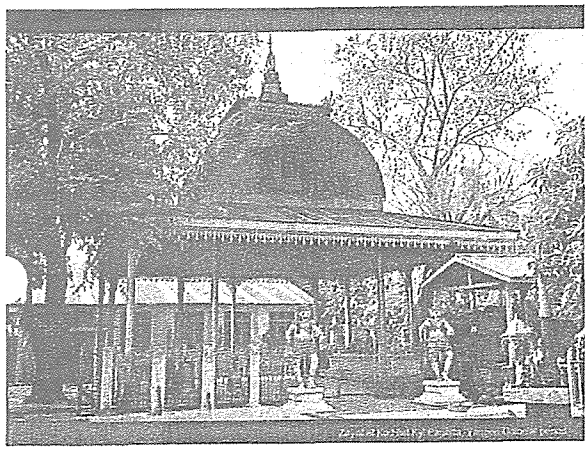
Wooden architecture Colonial Period:

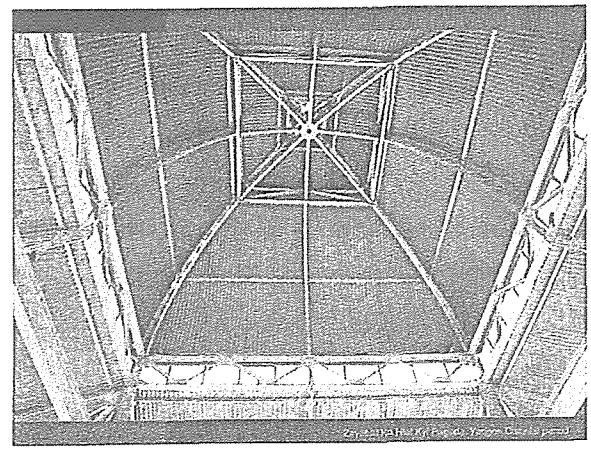
new materials were introduced . . . .

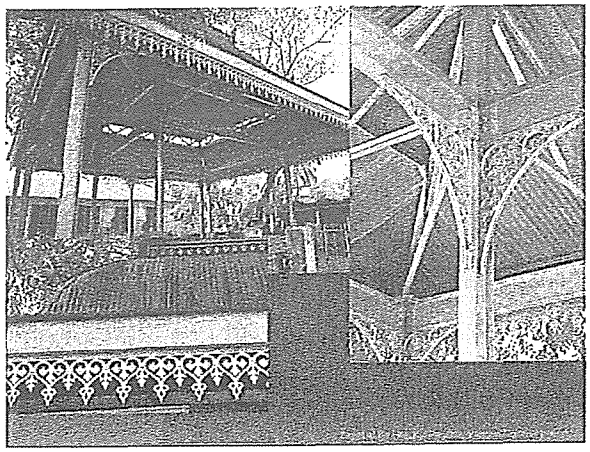


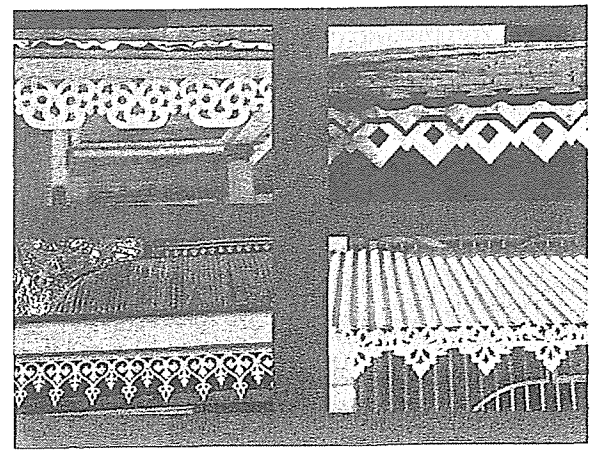


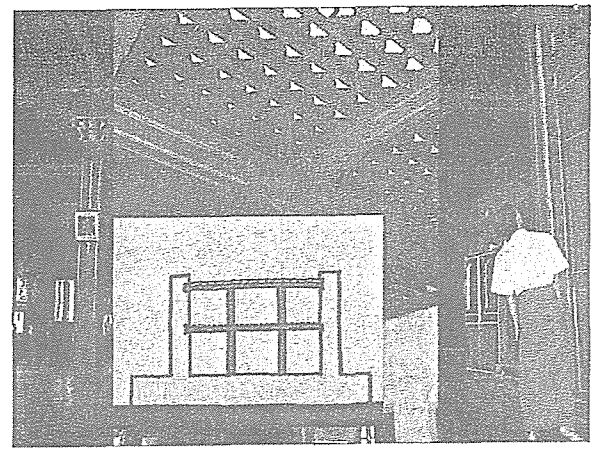








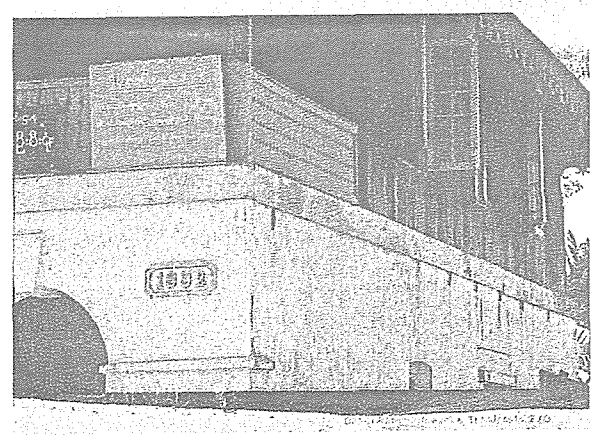


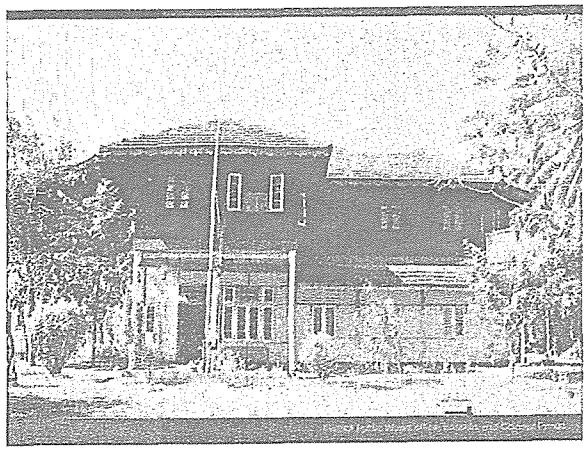


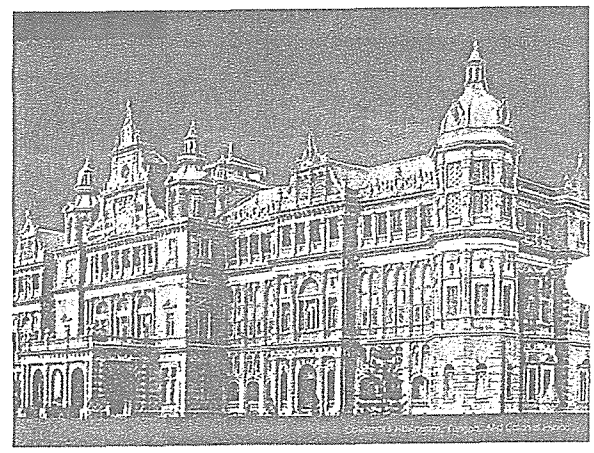
Wooden architecture Colonial Period:

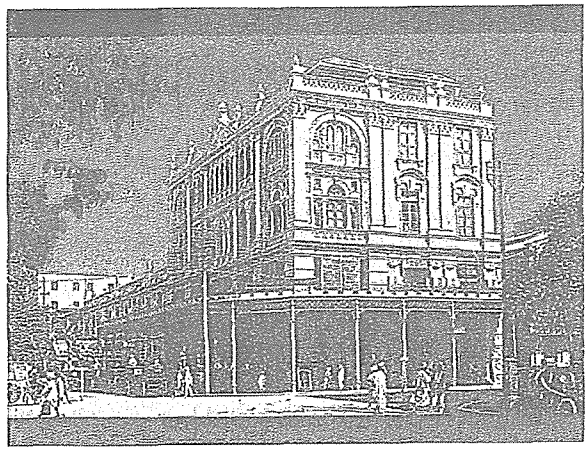
new types of buildings . . . .

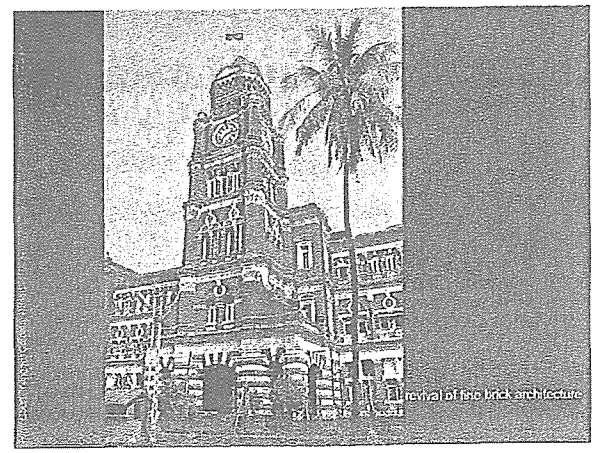
- Religious buildings
- Residences ; Palaces, Houses
- Public buildings
- Government / Institutional buildings

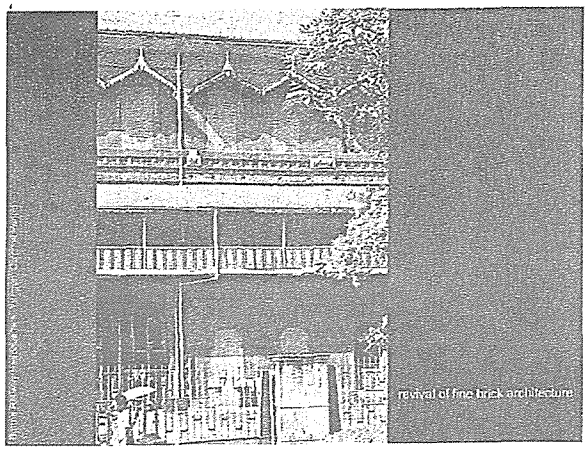


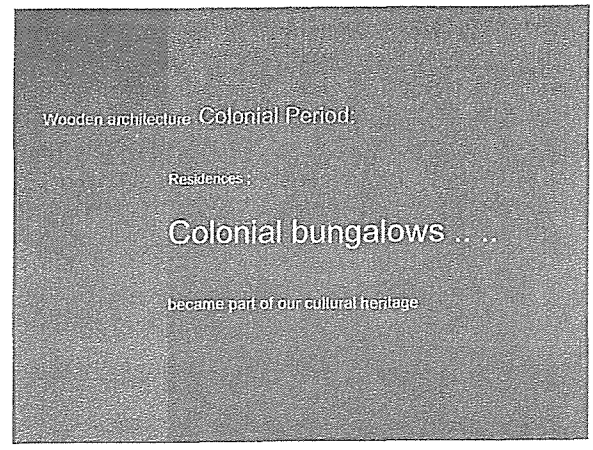


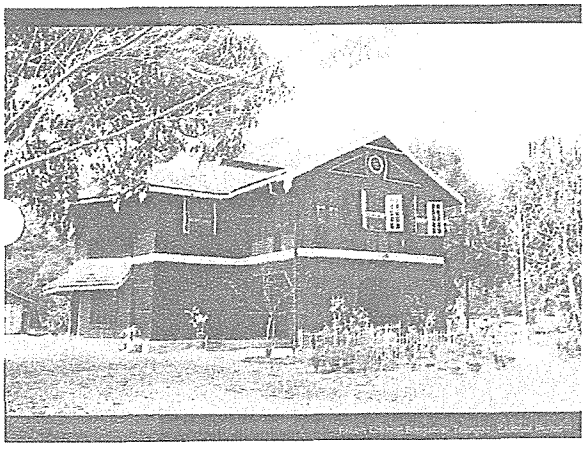


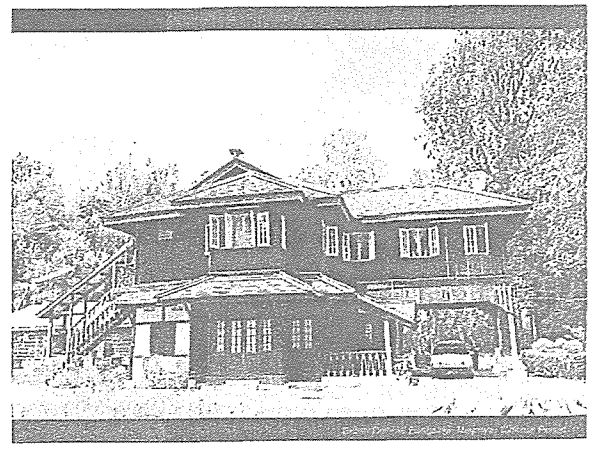


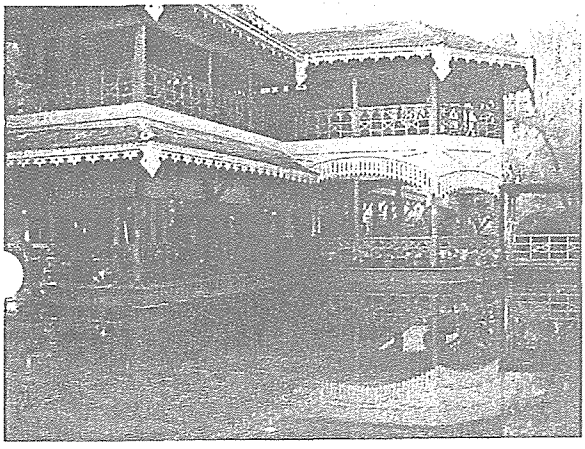


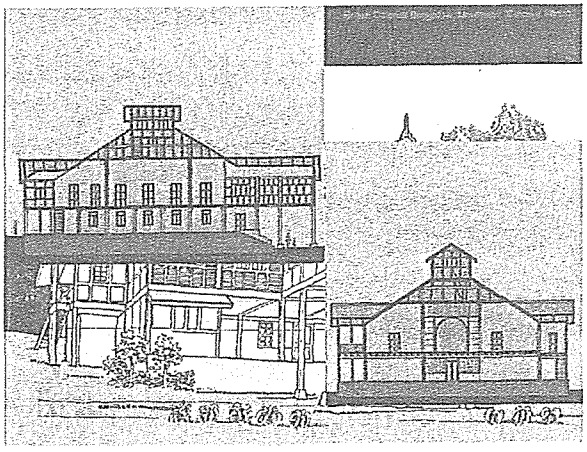

revival of fine brick architecture

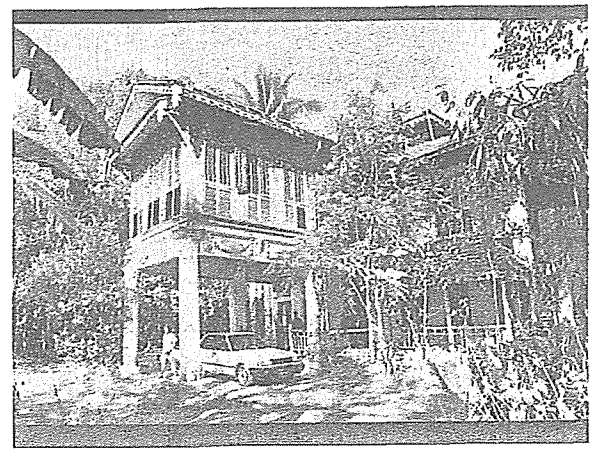

Wooden architecture Colonial Period:
Residences ;
Colonial bungalows .. ..
became part of our cultural heritage

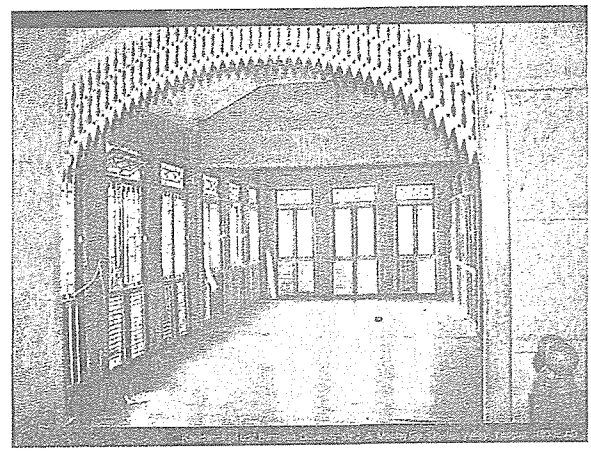


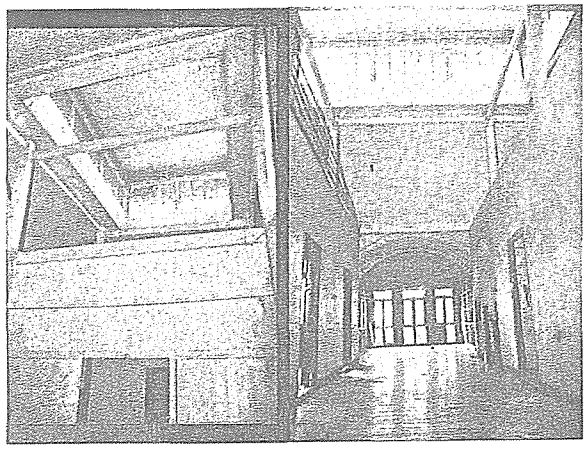


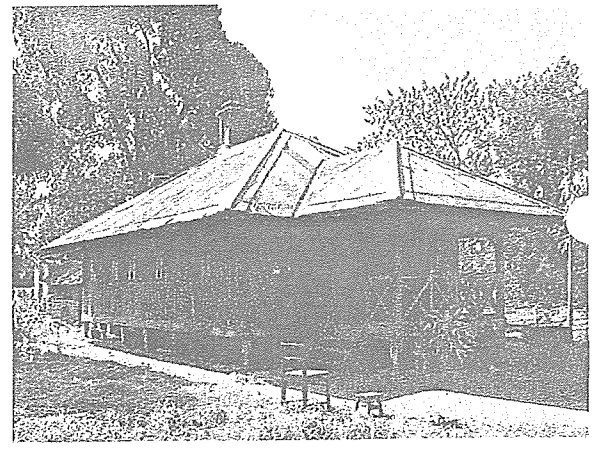








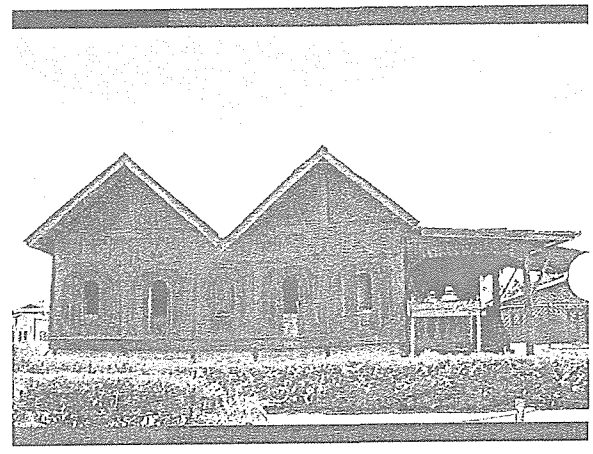


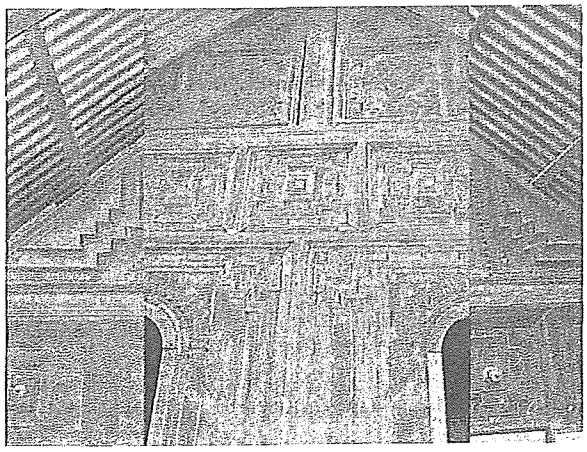


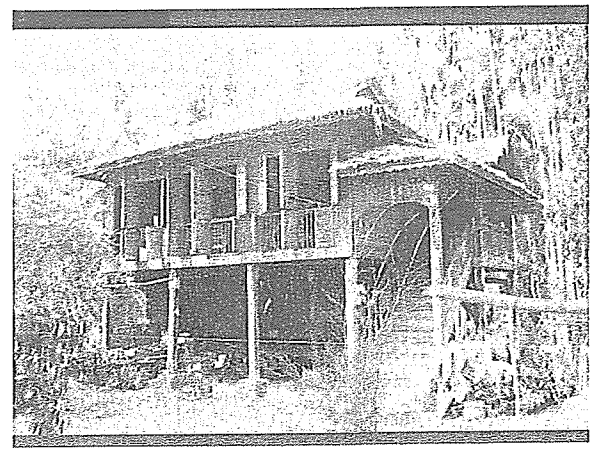
Wooden architecture Colonial Period:

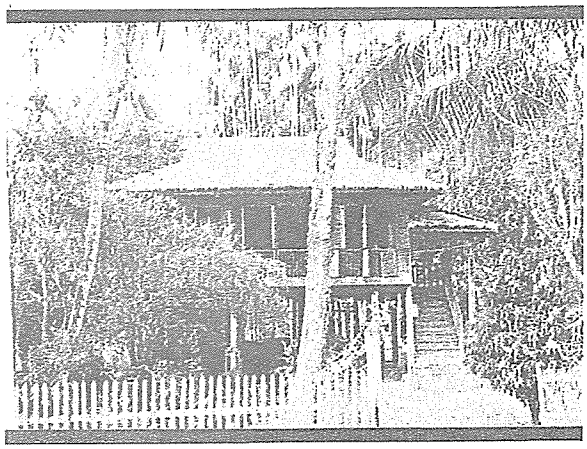
Residential buildings:

Wooden Houses .....









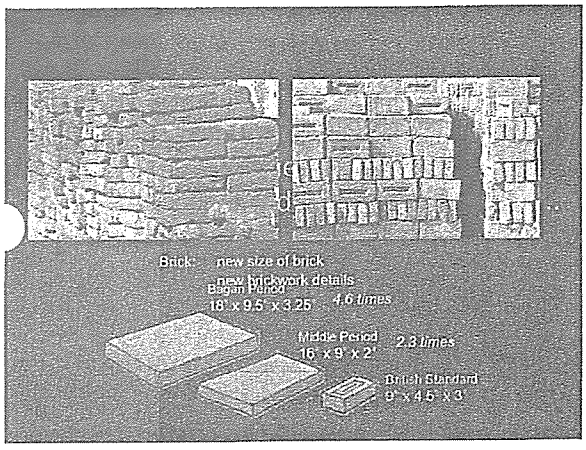
Wooden architecture Colonial Period

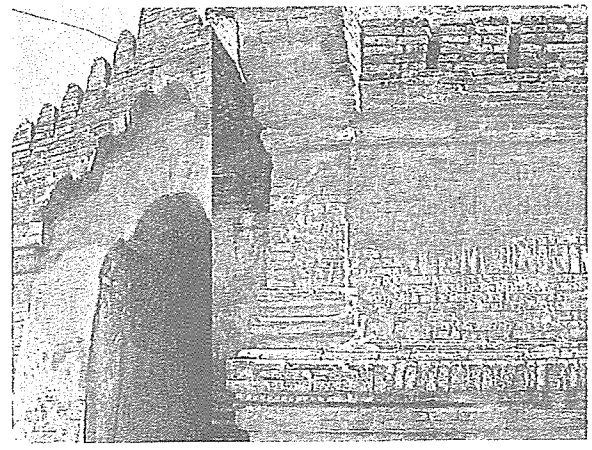
new construction methods
& new standards were introduced. . .

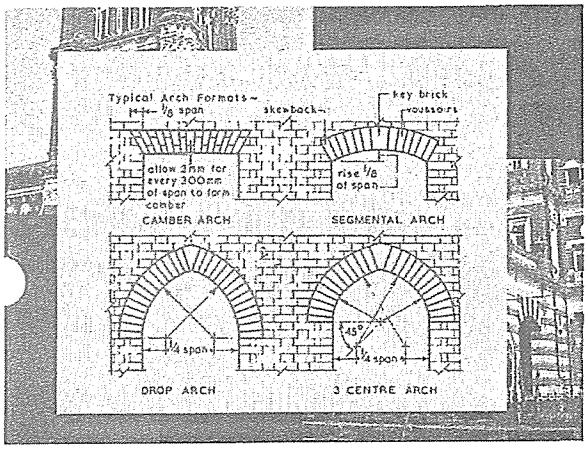
FPS measurement system was introduced to (Burma) Myanmar

Brick: new size of brick
new brickwork details

Timber: new sizes of timber members
new timber construction details







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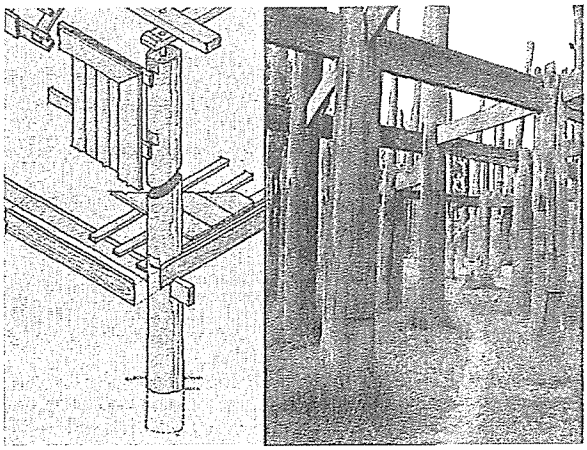
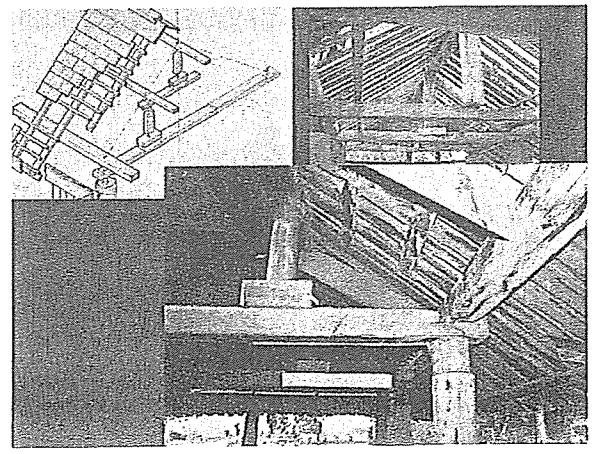
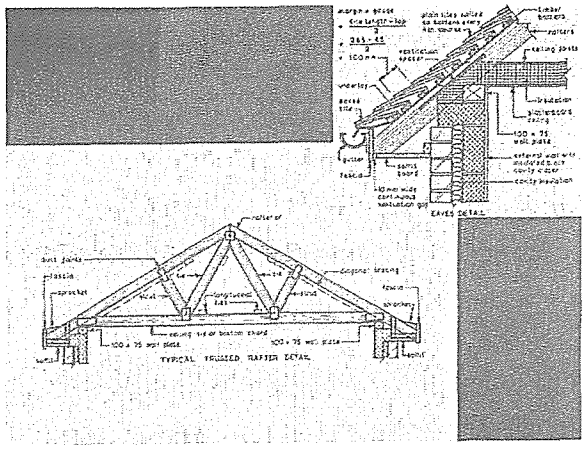
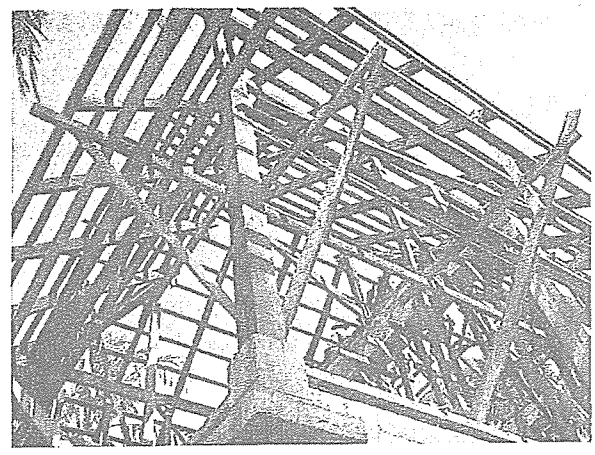
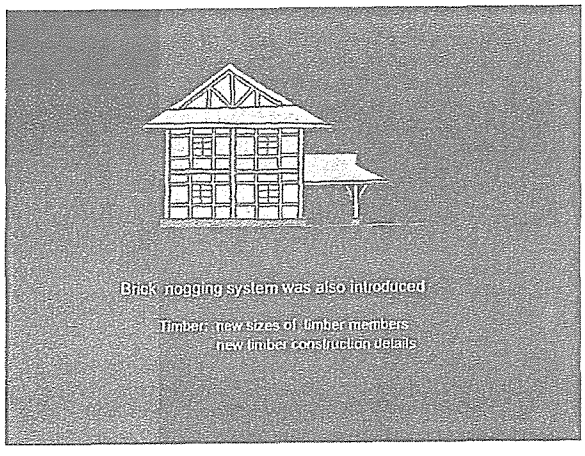
Timber: new sizes of timber members
new timber construction details

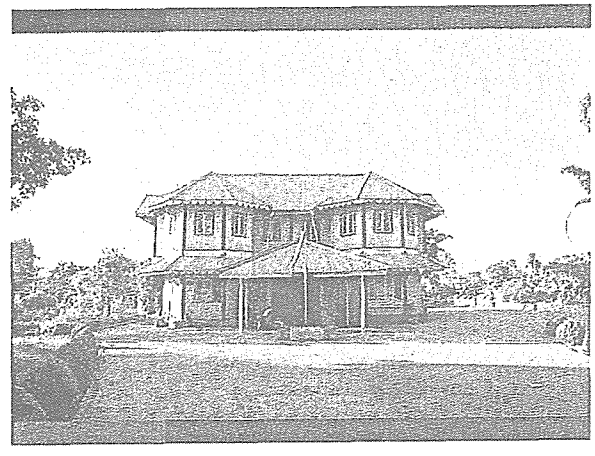


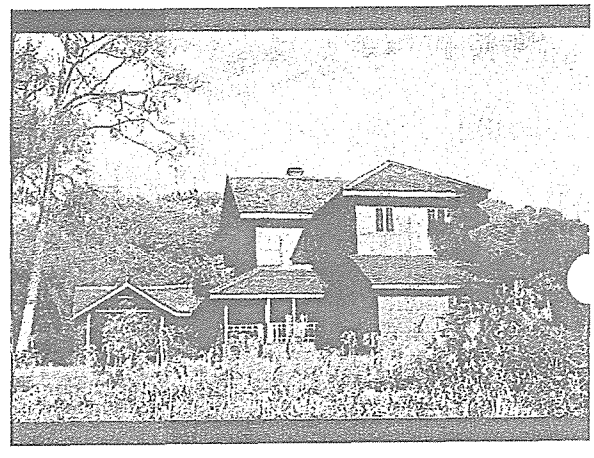


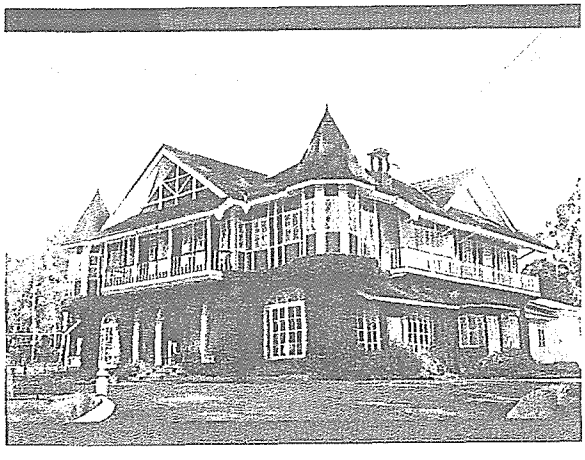

EAVES DETAIL
TYPICAL TRUSSED RAFTER DETAIL

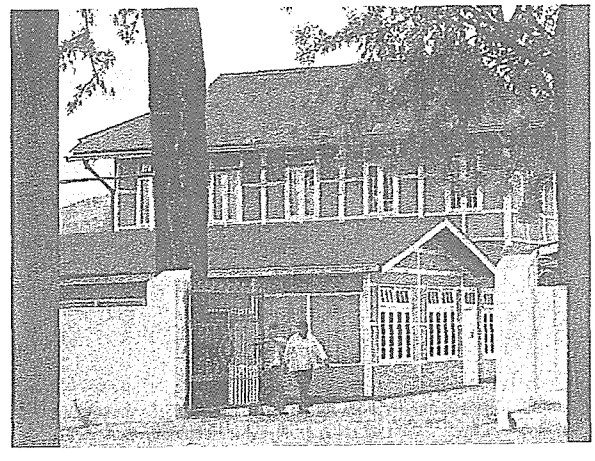


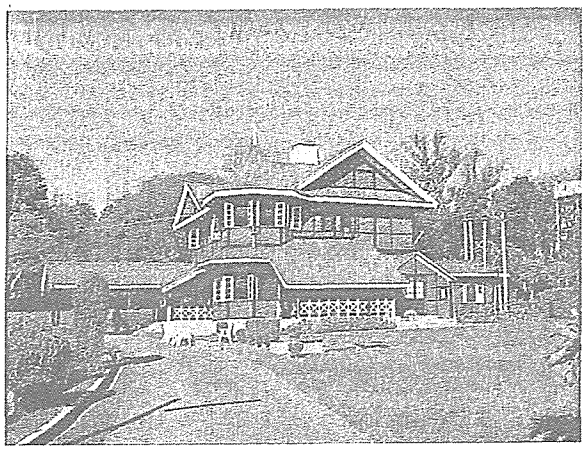

Brick nogging system was also introduced
Timber: new sizes of timber members
new timber construction details

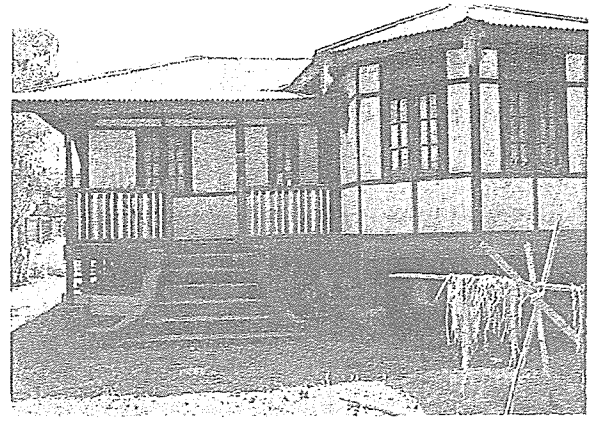












Wooden architecture Colonial Period:

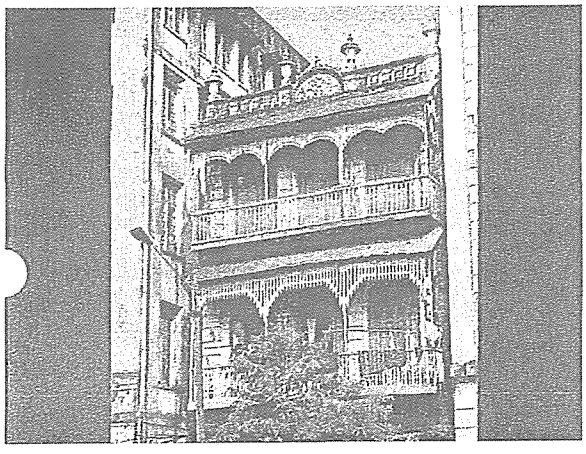
new types of buildings .. ..

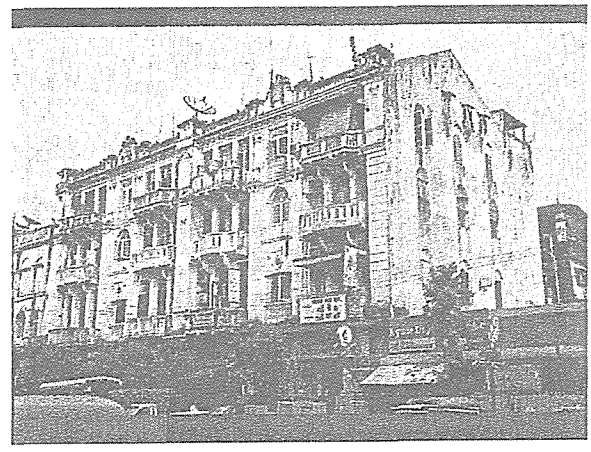
- Religious buildings
- Residences ; Palaces, Houses Apartments
- Public buildings
- Government / Institutional buildings

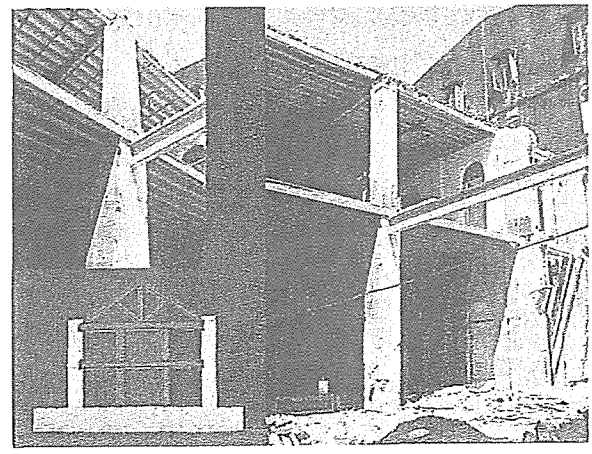
Wooden architecture Colonial Period:

Residences ;

Apartments In (Rangoon) Yangon .. ..







Wooden Architecture:
Post Independence Period

19th AD - present

Pre-Bagan period
Bagan period
1

Middle period
Konebong period
2

Colonial period
3

post-independence period
4

5

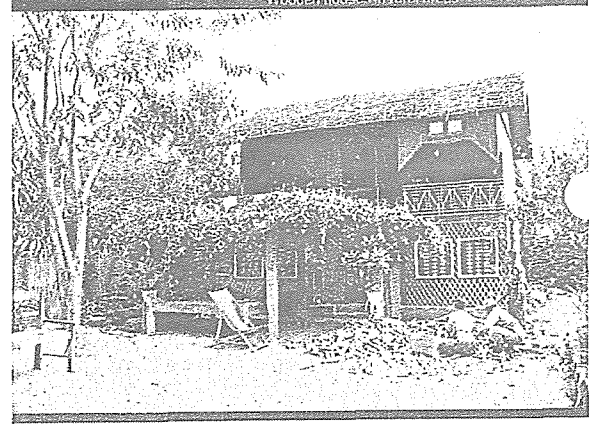
Wooden architecture Post-independence Period:
new types of buildings . . . .

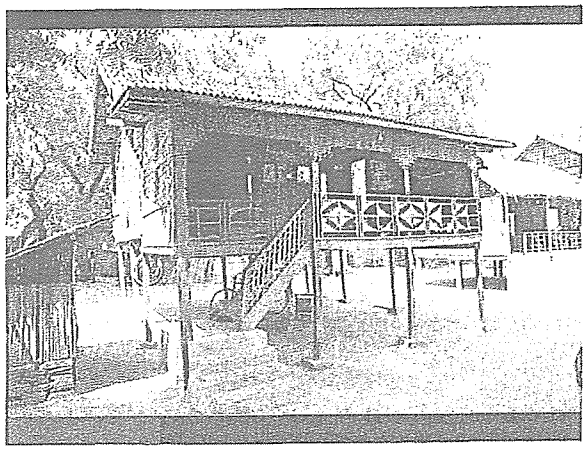
- Religious buildings
- Residences ; Houses, various types of Housing
- Public buildings;
- Government / Institutional buildings / Commercial
- Hotels / + +

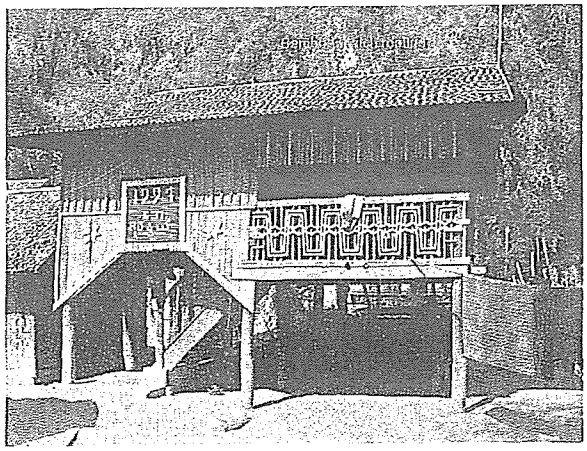
Wooden architecture Post-independence Period:
Wooden Houses . . . .

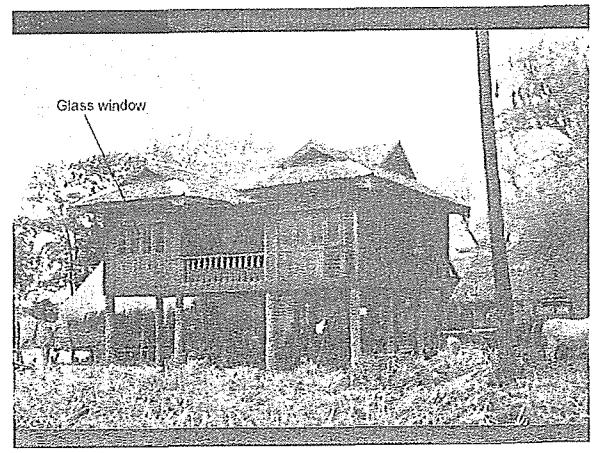
Urban, Sub urban, Rural ,.

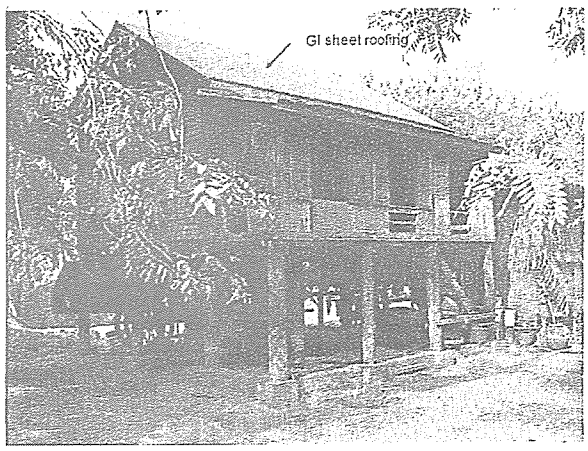
Wooden houses in rural areas

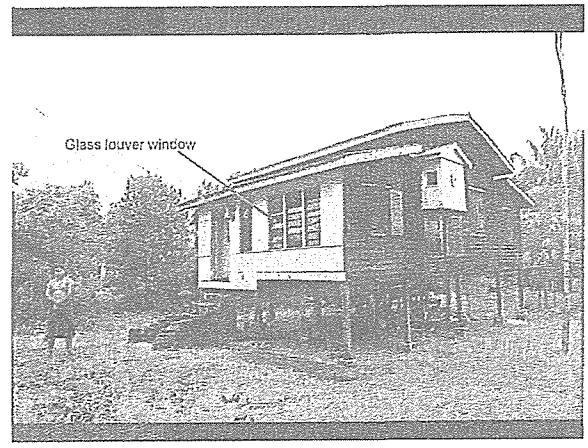


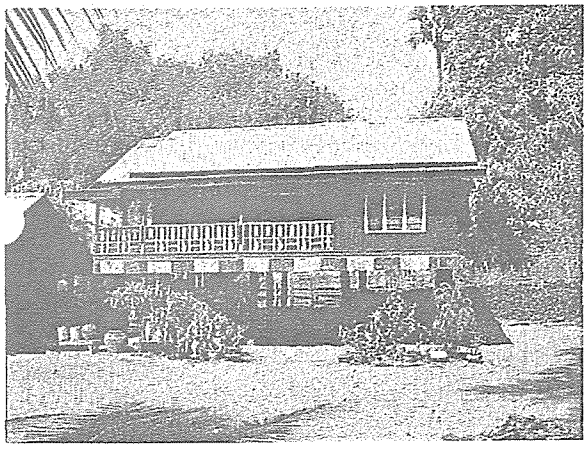


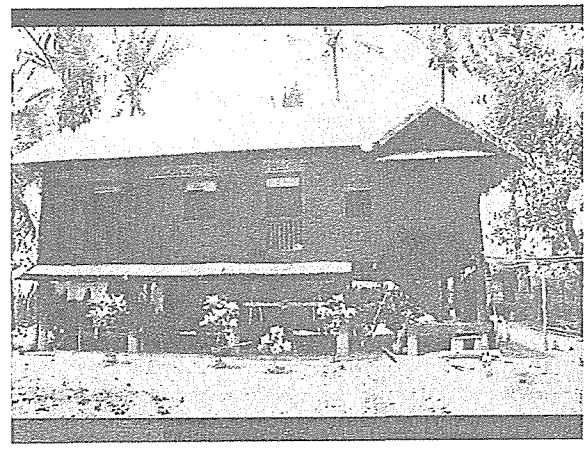


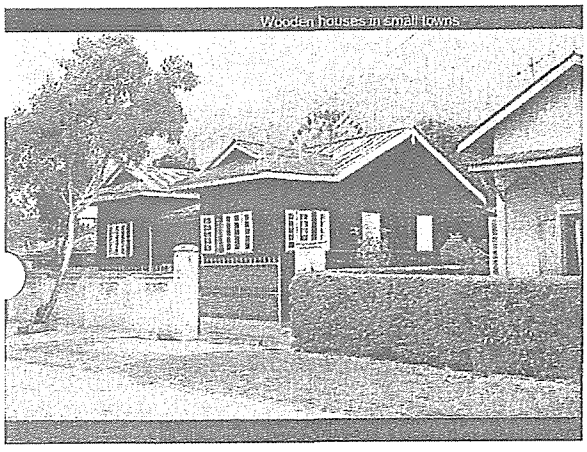


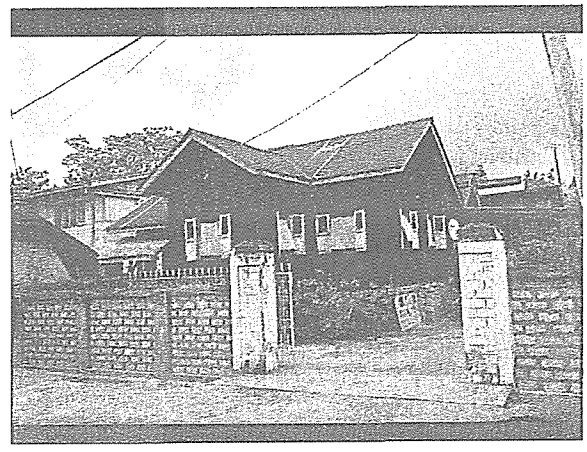

GI sheet roofing

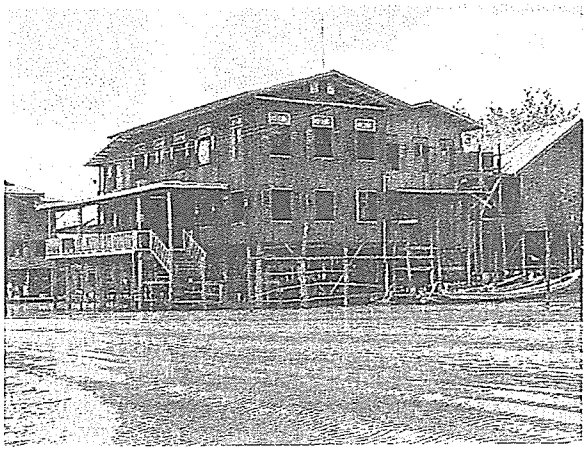

Glass louver window

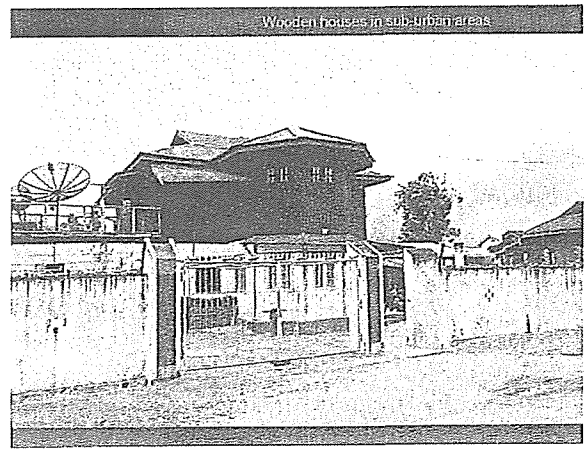


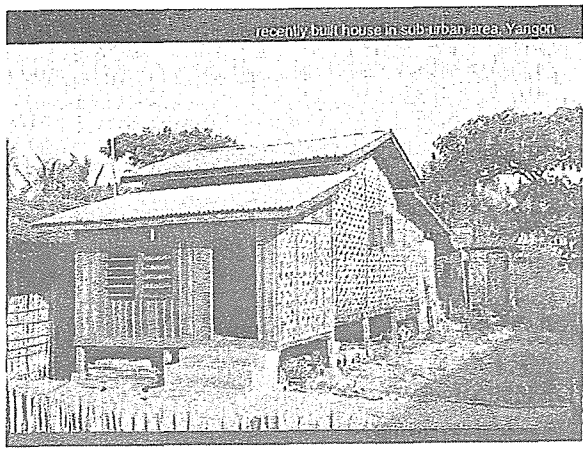


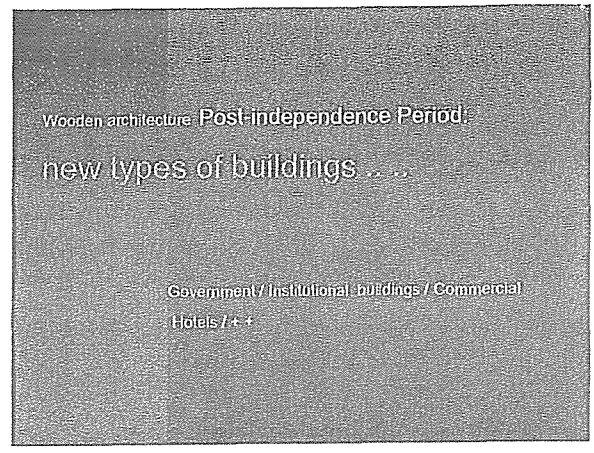

Wooden houses in small towns

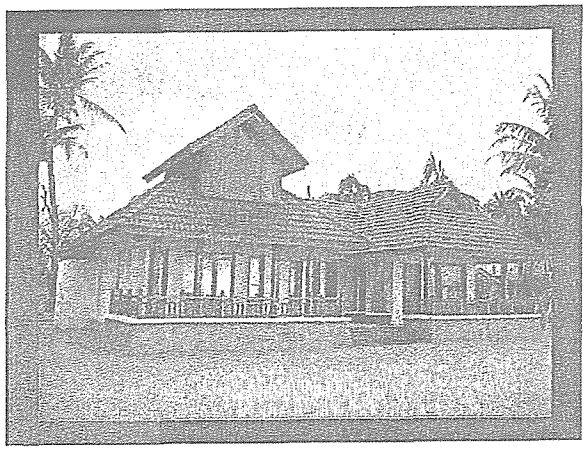


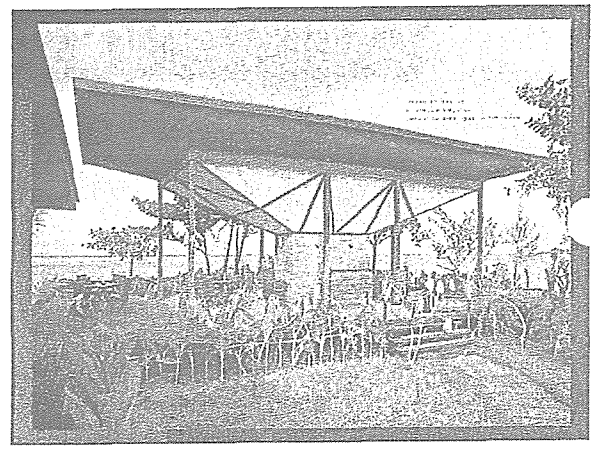


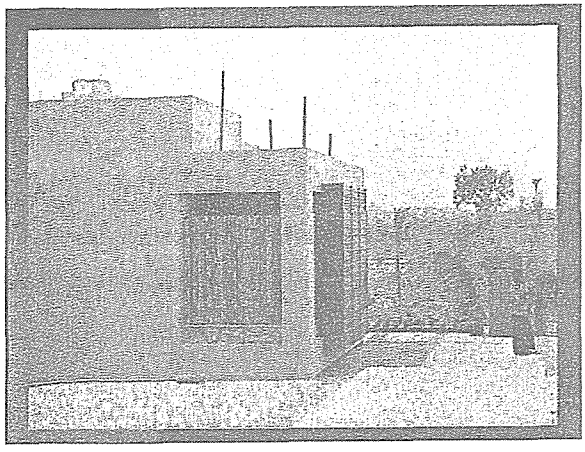

Wooden houses in sub-urban areas

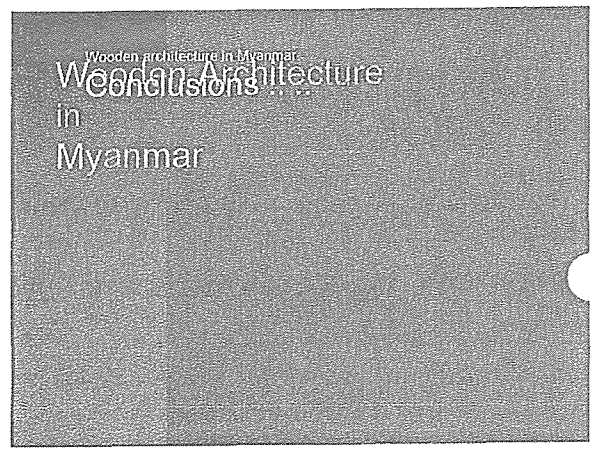

recently built house in sub-urban area, Yangon

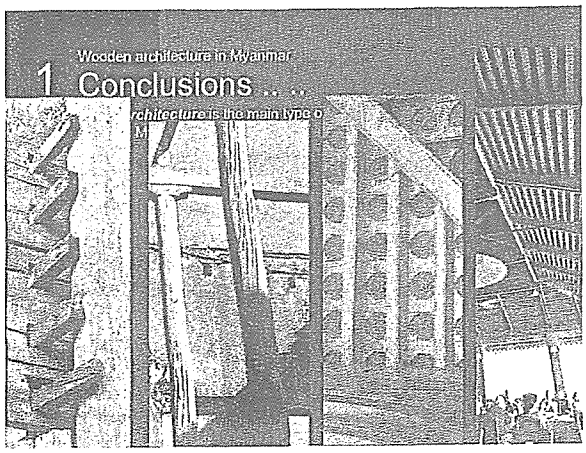

Wooden architecture Post-independence Period:
new types of buildings . . .
Government / Institutional buildings / Commercial
Hotels / + +

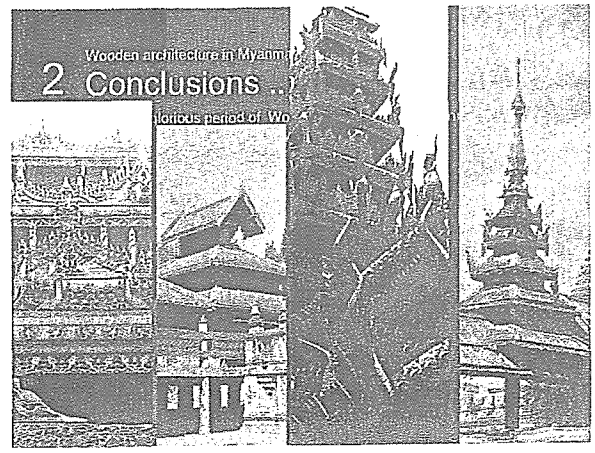


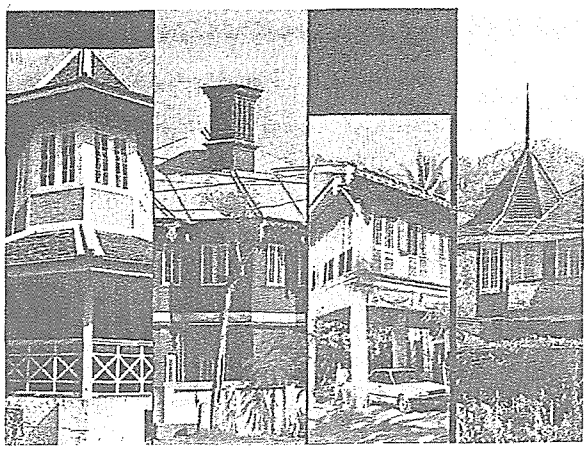





Wooden architecture in Myanmar
Wooden Architecture
in
Myanmar
Conclusions . . .


Wooden architecture in Myanmar
1 Conclusions . . .


Wooden architecture in Myanm
2 Conclusions . . .

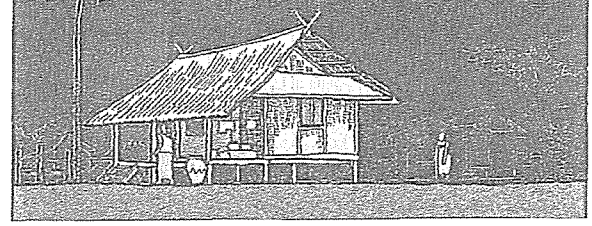


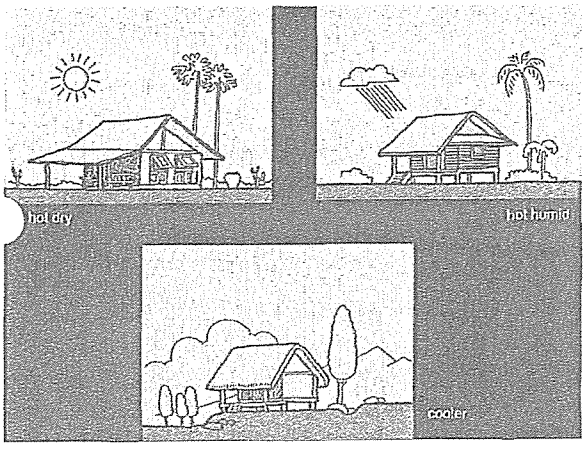
Wooden architecture in Myanmar

4 Conclusions .. ..

Currently, the wooden buildings are mainly used as by Myanmar people in rural areas all over the country.

In urban areas, most of the new buildings are built by reinforced concrete and steel.





Wooden architecture in Myanmar

5 Conclusions .. ..

Recently, the fine examples of contemporary Wooden Architecture can be found only in specially required buildings such as resort hotels, cultural buildings, religious buildings and specially designed residences.

At present, the demand of timber in construction industry is far more than availability of timber in local market. Wooden Architecture becomes a luxurious commodity and become status symbol for the elite class.

Wooden architecture in Myanmar

6 Conclusions .. ..

Challenging issues concerning future development & promotion of Wooden Architecture

Challenging Issues:

(1)Reduced production of timber due to limited resources.

(2)Short of timber supply for local construction industry

(3)Soaring high price of timber for construction

(cost of 2nd class teak wood for construction is 22 times higher within 10 years)

(4)Decrease in quality of timber for construction;
- wood produced from un-matured trees
- not properly seasoned (less dimensional stability)
- not properly sawn (sub-standard shape and size of timber)
- etc.

(5)Lack of understanding: using wooden buildings is an important selection of material for the sustainable environment

(6)Lack of awareness: less negative environmental impact of wooden buildings compare to other types of buildings with different materials used

Wooden architecture in Myanmar

7 Conclusions .. ..

for the future development & promotion of Wooden Architecture

for the future development & promotion of Wooden Architecture ..

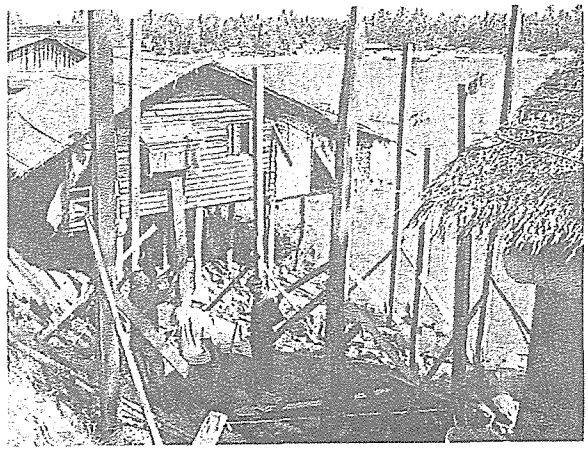
(1)Urgent need for environmental education to general public emphasizing use of environmental friendly building materials such as timber etc.

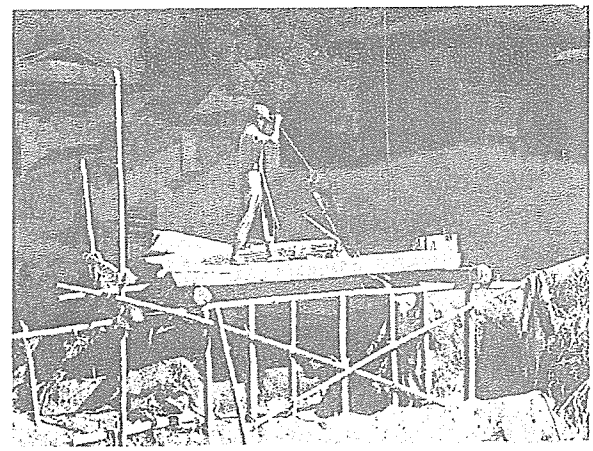
(2)Urgent need for education to general public on energy efficiency and energy conservation in newly built buildings by selection of appropriate building materials such as timber etc.

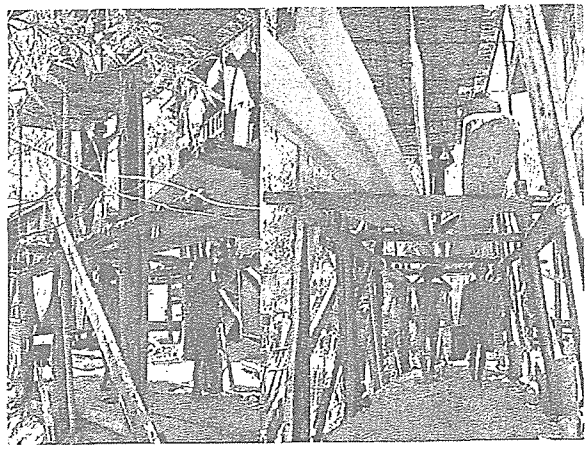
(3)Need for latest technology transfer from the developed countries to Myanmar architects, engineers and technicians concerning wooden building construction technology and methods.

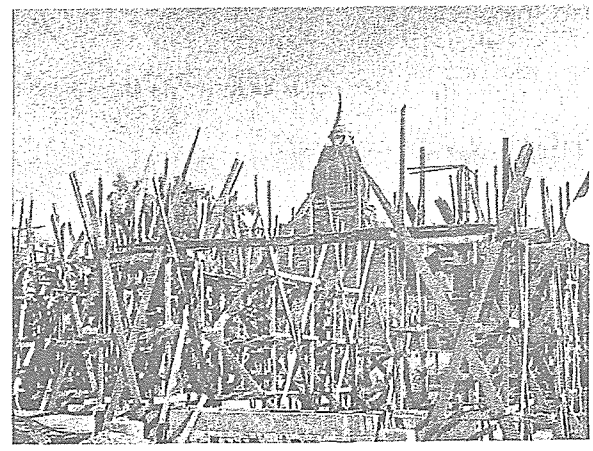
(4)Need for contribution from developed countries on establishment of necessary training centers, laboratories, research facilities to conduct timber research works for construction industry in Myanmar.

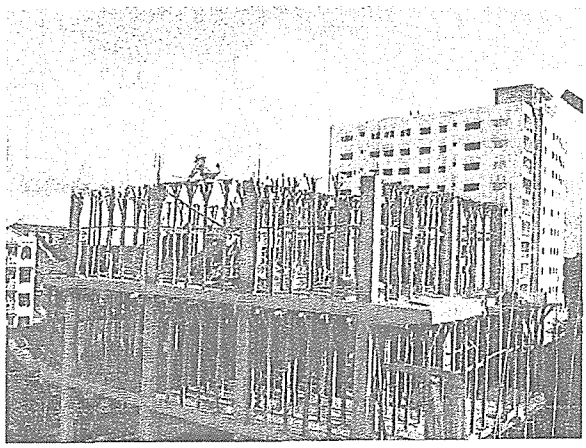
(5)Need for provision of scholarships, research grants and appropriate arrangements from developed countries to Myanmar researchers to attend conferences, seminars and workshops on wooden architecture and relative subjects.

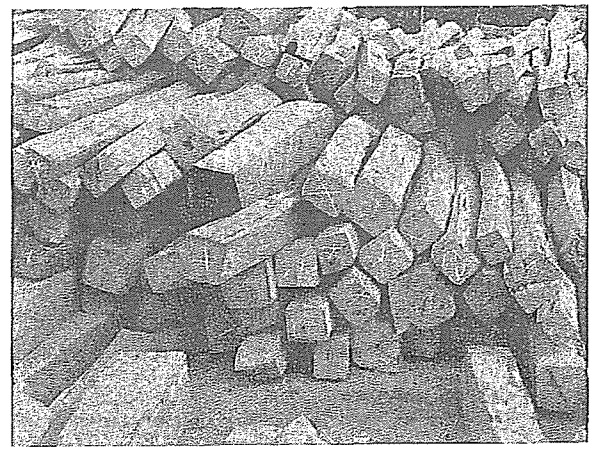


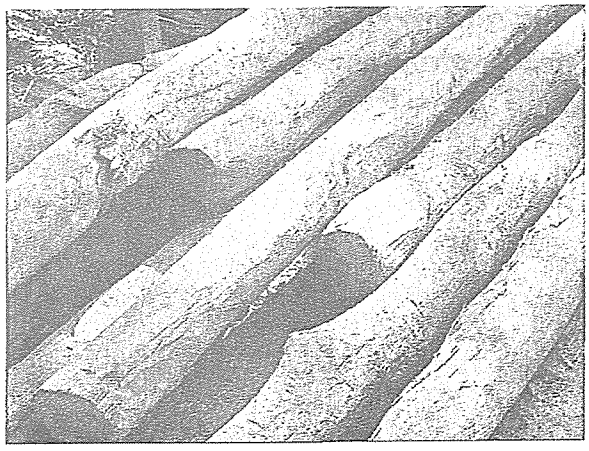


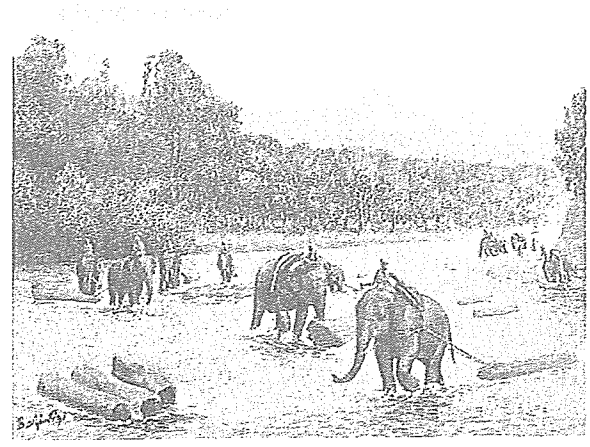












7. The Current State of A Wooden Architecture and Challenging issues in Nepal

Prof. Dan Heera Kansakar

The Current State of Wooden Architecture and Challenging Issues in Nepal
ネパールにおける木造建築の現状と課題

The historical development of wooden architecture of Kathmandu Valley (Nepal Valley) is believed to have begun 2000 years ago, however the first authentic dates and facts that appear through state inscriptions goes back only to 5th century when Lichhavi Dynasty ruled the Kathmandu valley. Stone inscriptions (Silapatras) and copper plaques (Tamapatras) recording the construction of buildings and sculptures provide a relatively precise picture of the development of ancient wooden architecture found in Kathmandu valley today. Most of the development occurred during the rule of Malla dynasty (Newar rulers) from the late 12th century through 18th century. For this reason, the Malla dynasty era is considered the golden period in the history of wooden architecture of Kathmandu Valley.

New development of wooden architecture in present day Kathmandu valley has slowed down considerably. Due to uncontrolled urbanization and rapid deforestation, the government has been forced to adopt a deforestation policy that has made wood hard to get and expensive. Despite difficulty in obtaining wood, the government of Nepal encourages use of traditional wooden windows/doors in residential/ commercial building construction, however no special subsidies or tax breaks are provided. Additionally, through public-private partnership, the government has also been encouraging participation in international trade fairs for promotion of traditional wooden architectural doors, windows, idols, temples etc. for export purposes. These products have high demand in the international market and the export of wooden craftsmanship is seen as essential in helping the skilled craftsman to make a good living by continuing with their age-old profession as well as help the economy of Nepal.

At present, the most challenging issue concerning the development and promotion of wooden architecture is deforestation control and conservation of traditional historic buildings with modern technology. As a measure to solve the deforestation problem, the government and various NGOs have implemented programs to plant trees all over Nepal and supply tree plants freely and easily to public, but it has not been effective enough. The existing historical wooden architectures that have been designated as world heritage sites by UNESCO are being preserved and maintained under UNESCO's supervision. Other structures have been renovated and maintained through collaboration between the government, city, and the local community.

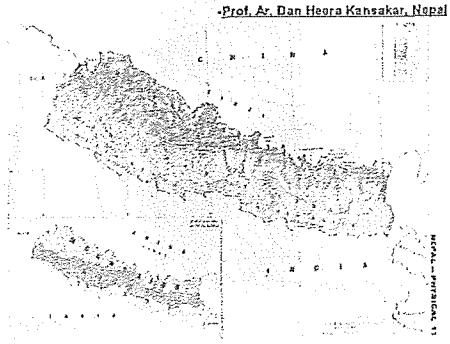
カトマンドゥ渓谷（ネパール渓谷）の木造建築の歴史は 2000 年前に始まったと言われているが、発掘された碑文にはリッチャヴィ王朝がカトマンドゥ渓谷を統制していた5世紀に始まったと記されている。その石碑文（シラパトラ）と銅盾（copper plaque：タマパトラ）に、当時の建築技術と彫刻技術が刻まれている。いにしえの木造建築物の建設工程を示す比較的詳細な絵らしきものも見ることができる。建築技術はその後 12 世紀後半から 18 世紀にかけて栄えたマッラー王朝（ネワール人）の統制下で大いに発展したと見られている。マッラー王朝はカトマンドゥ渓谷の木造建築における黄金時代を築いたわけである。

しかしながら、カトマンドゥ渓谷の木造建築の発展は、近年劇的にスローダウンしている。政府は急激なスプロール化と森林伐採を受け、値段を上げて木材を入手困難にするという対策を採ってきた。矛盾するようではあるが、政府はまた、住宅や商業ビルへの伝統的な木製窓やドアの利用についての奨励も行っている。しかしこれに補助金や税制優遇はない。また、産業界と協同して国際見本市への参加も奨励している。伝統的な木製ドアや窓、偶像（idol）、寺院（temple）などの製品は国際市場でも需要があるし、それらを輸出すれば熟練した職人たちの暮らしも豊かになる。国の経済のためにも伝統木造技術の継承のためにも欠かせない政策なのである。

木造建築の発展と促進のための当面の最重要課題は、伐採をコントロールすることと、最新の技術によって伝統的な建築物を保存していくことである。伐採対策としては既に、政府や多くの NGO が国土全体を対象とした植林や公共樹木の供給などさまざまなプログラムを実施しているが、まだ十分ではない。保存政策については、ユネスコ世界遺産に指定された現存する伝統木造建築はユネスコの監督の下で維持管理されており、その他の建築物は国や地方公共団体の協力体制においてリノベート、管理されている。

The Current State of Wooden Architecture and Challenging Issues in Nepal

•Prof. Ar. Dan Heera Kansakar, Nepal



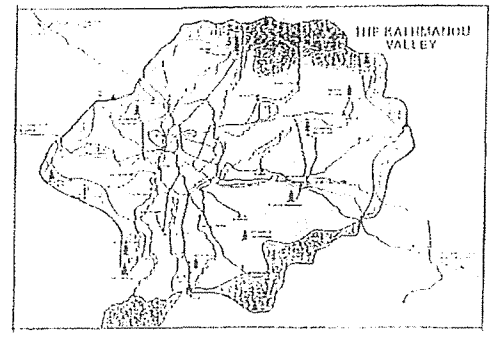
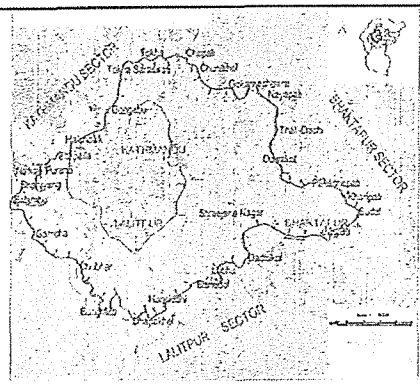


Fig. 3. Kathmandu Valley Map



Kathmandu Valley Topographic Map

I.Historical development of wooden architecture in Kathmandu valley.

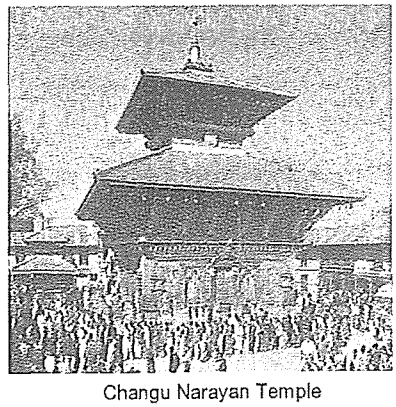
The Kathmandu valley also referred to as Nepal valley used to be a dominating power in the central part of the Himalayas two thousand years ago.

•The valley was under the rule of the Lichhavi Dynasty in the 5th and 6th century.

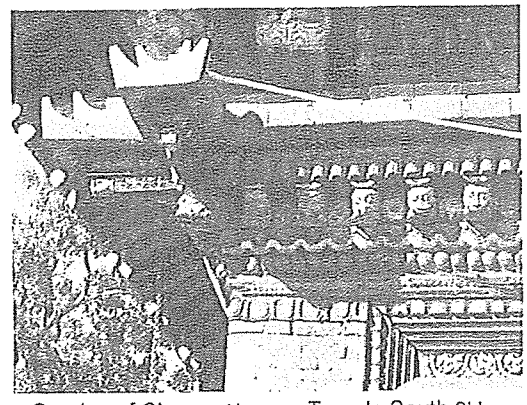
•One of the most famous examples of rich wooden architecture from this era is the Changu Narayan temple and Kasthamandapa.

•The Malla dynasty came to power in the late 12th century and ruled the Kathmandu valley till the 18th century.

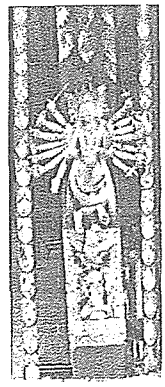
•The following is a list of some of the UNESCO listed world heritage sites that exemplify the rich wooden architecture of Nepal:



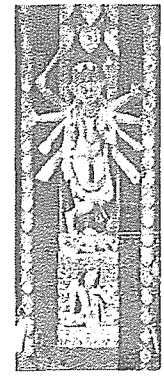
Changu Narayan Temple



Cornice of Changu Narayan Temple South Side

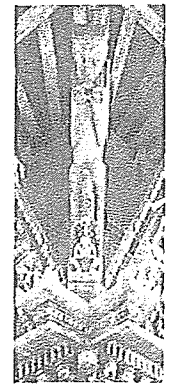


Lower Roof Strut of Cangu Narayan Temple (Ananta Vishnu)



Lower Roof Strut of Changu Narayan Temple (Bhairava)

Lower Roof Strut of Changu Narayan Temple (Parshurama)



Lower Roof Strut of Changu Narayan Temple

Lower Roof Strut of Changu Narayan Temple (Bishworoop Krishna)

Lower Roof Strut of Changu Narayan Temple (Kubera)

Kashthamandapa

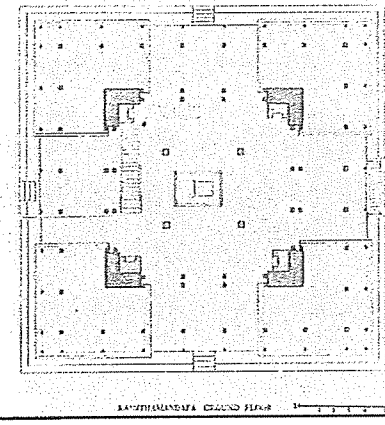
Kashthamandapa of Kathmandu also known as Maru Sattal located at Maru Tol of Kathmandu city exist since 16th Century.

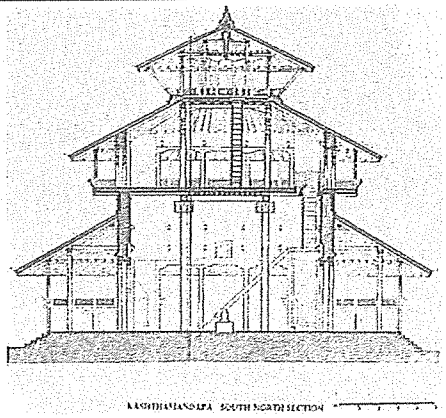
Many of its supporting columns, especially the four 7 meter high centre posts appear to be among the oldest surviving timber structures in the Valley.

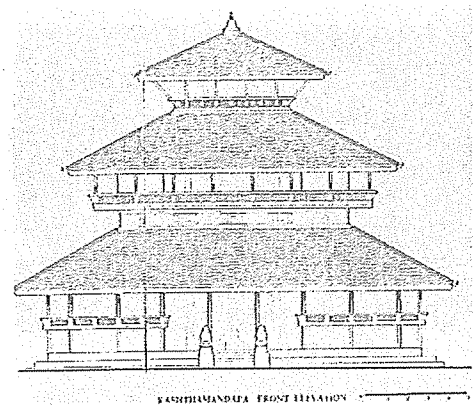
Legend has it that the timber used in the construction of the Kashthamandapa came form a single tree

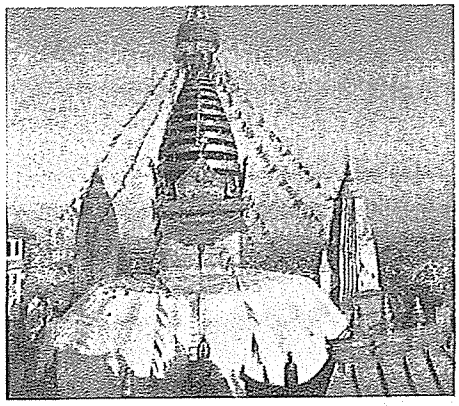
Kashthamandapa is erected on a base of 18.70m x 18.73 and is 16.30m in height.

Its construction demonstrates a very systematic way of the collection of loads and their distribution through posts and walls to the foundations.

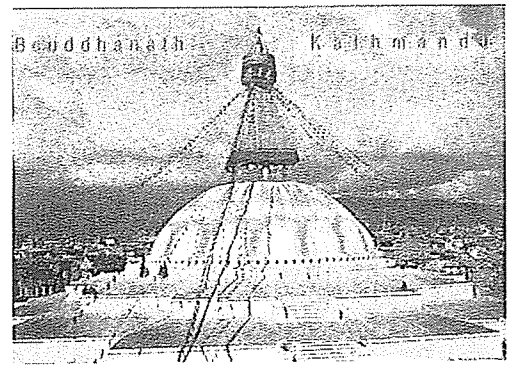




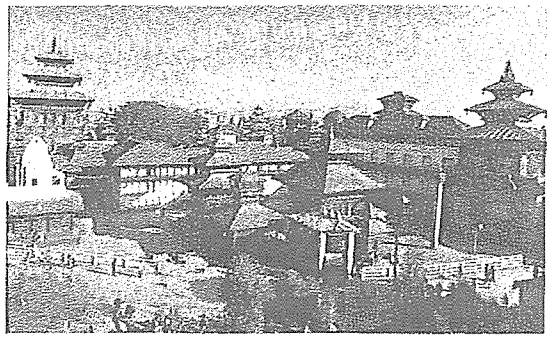




SWAYMBHUNATH TEMPLE

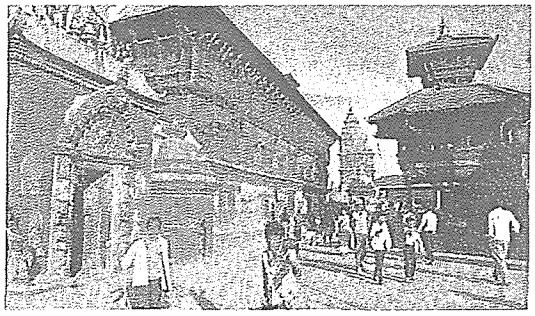


BOUDDHANATH TEMPLE

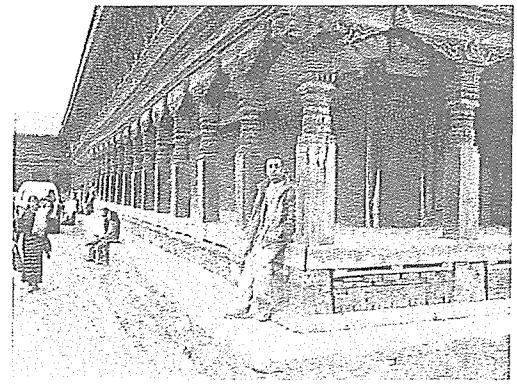


KATHMANDU DURBAR SQUARE

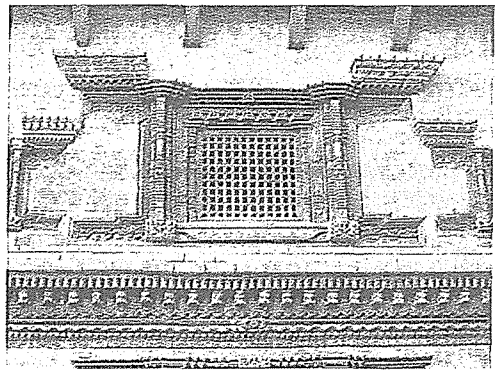
A ROYAL CARVED CORNER WINDOW AT KATHMANDU DURBAR SQUARE



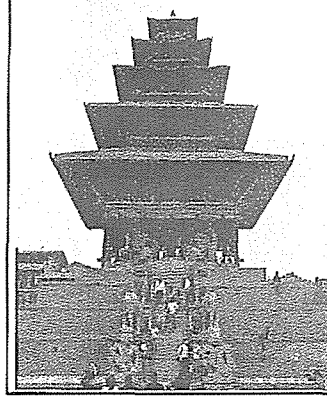
BHAKTAPUR DURBAR SQUARE



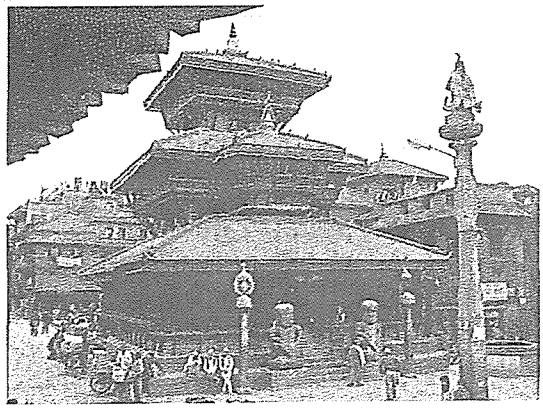
POST DETAIL AT BHAKTAPUR DURBAR SQUARE



A LATTICED WINDOW AT BHAKTAPUR

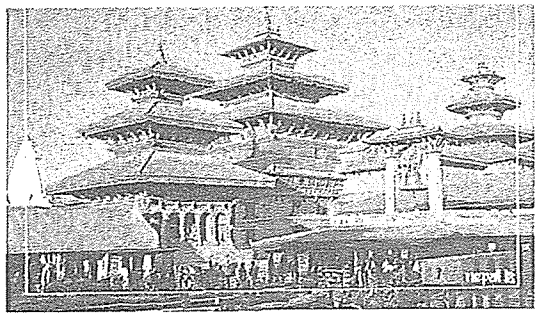


NYATAPOLA DEGA

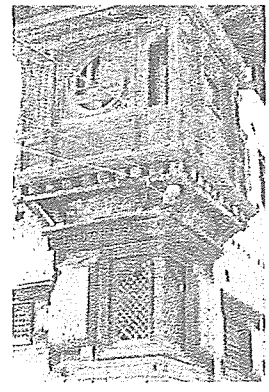


DATTATREYA SQUARE

DATTATREYA SQUARE

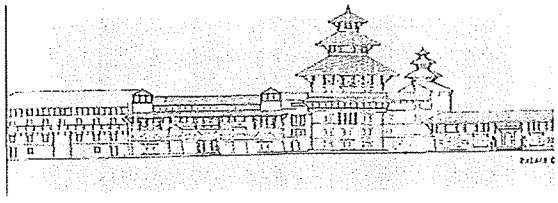


PATAN DURBAR SQUARE



CORNER WINDOW

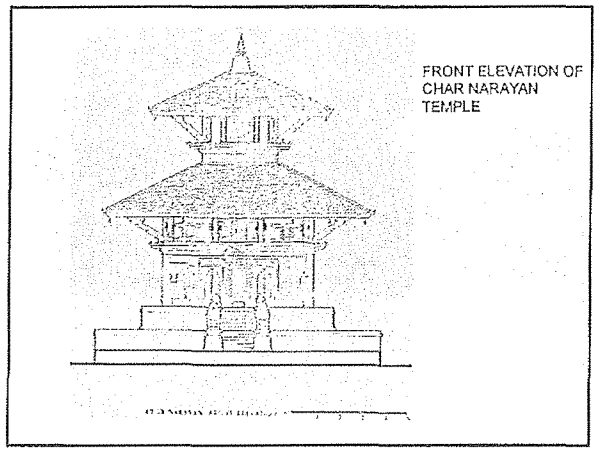
A RARE CARVED CORNER WINDOW AT PATAN DURBAR SQUARE



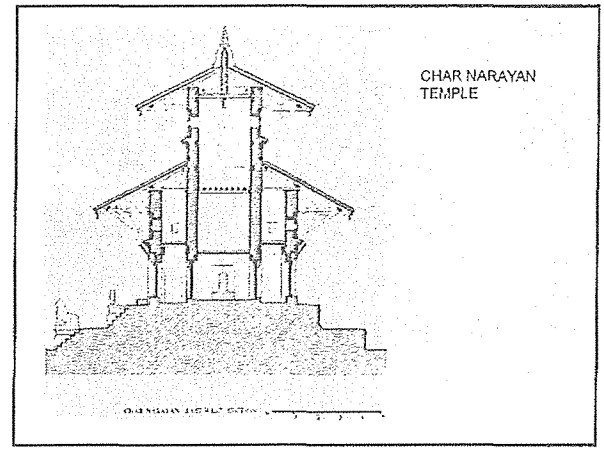
FRONT ELEVATION OF PATAN DURBAR SQUARE

CONSTRUCTION DETAILS

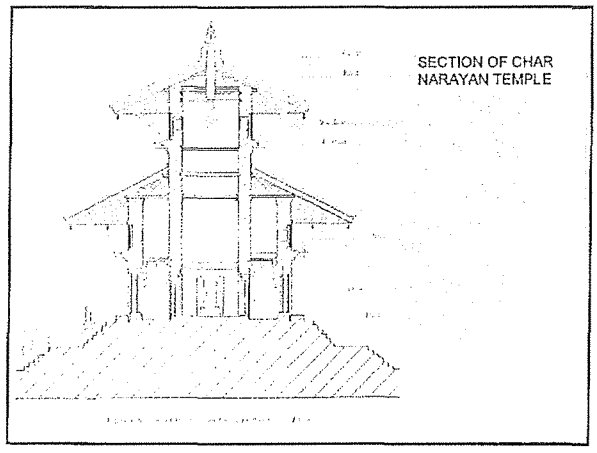
DRAWINGS AND PICTURES



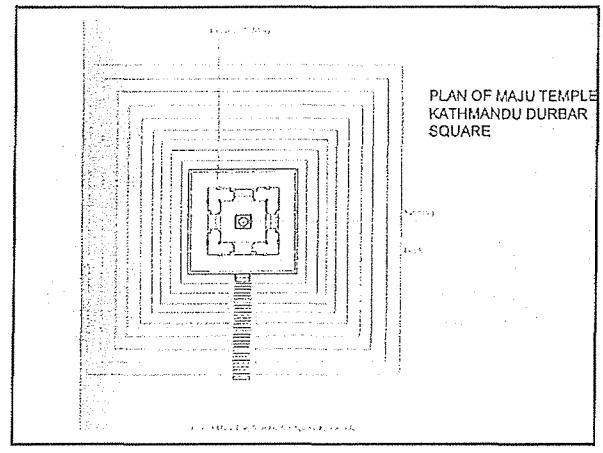
FRONT ELEVATION OF CHAR NARAYAN TEMPLE



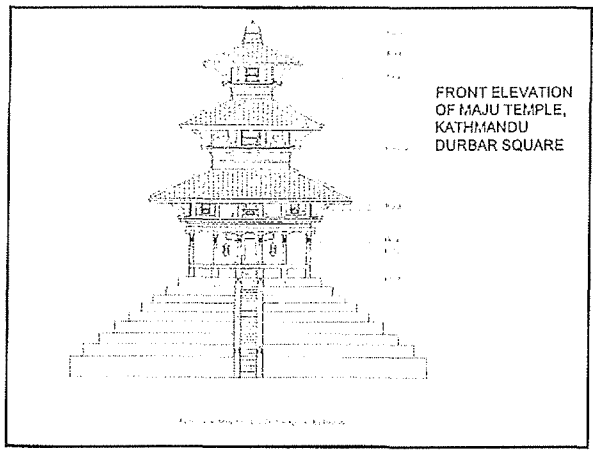
CHAR NARAYAN TEMPLE



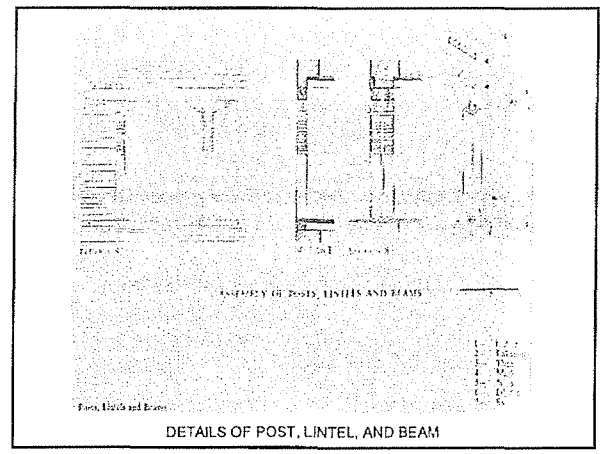
SECTION OF CHAR NARAYAN TEMPLE



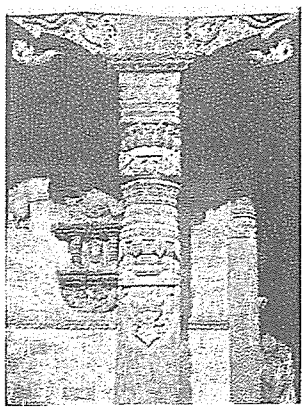
PLAN OF MAJU TEMPLE KATHMANDU DURBAR SQUARE



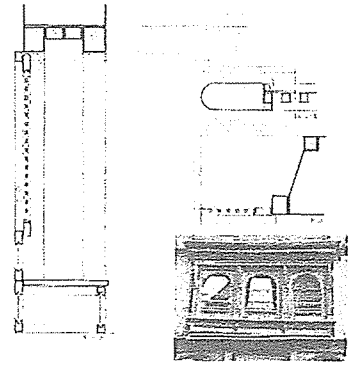
FRONT ELEVATION OF MAJU TEMPLE, KATHMANDU DURBAR SQUARE



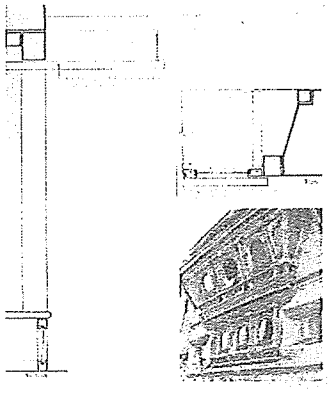
DETAILS OF POST, LINTEL, AND BEAM



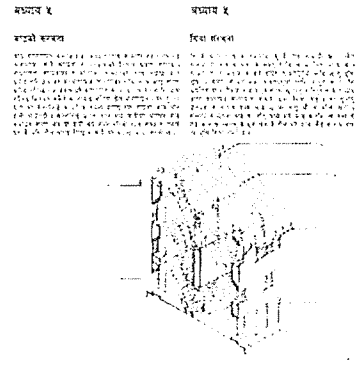
POST DETAIL



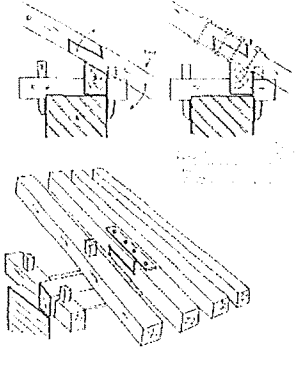
TRADITIONAL
WINDOW DETAIL



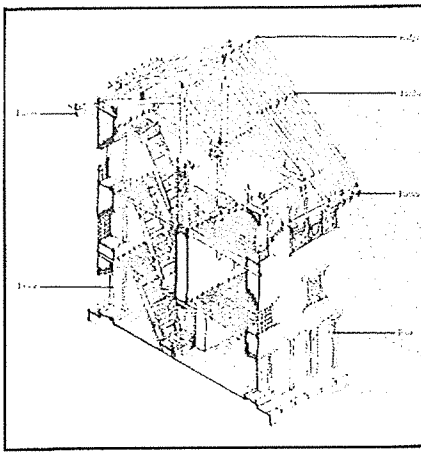
TRADITIONAL
WINDOW DETAIL



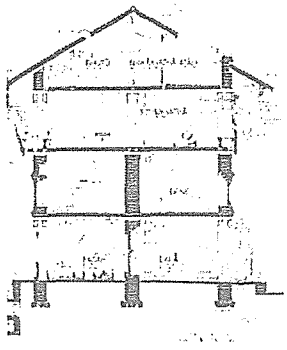
FLOOR AND ROOF DETAIL
OF TRADITIONAL NEPALI
HOUSE



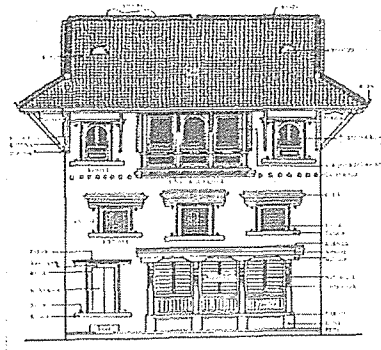
JOINT DETAIL



SECTIONAL
ELEVATION OF
TRADITIONAL
NEWARI HOUSE

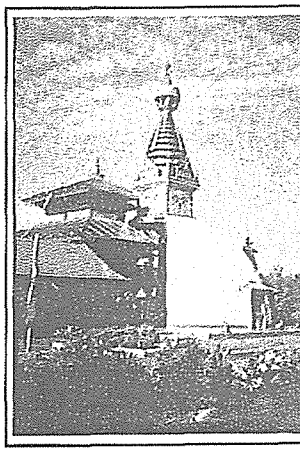


SECTIONAL ELEVATION OF TRADITIONAL NEWARI HOUSE

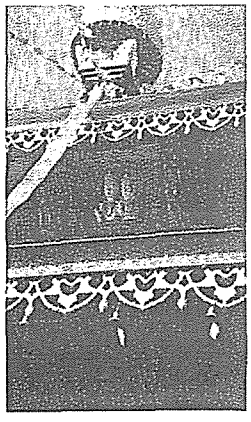


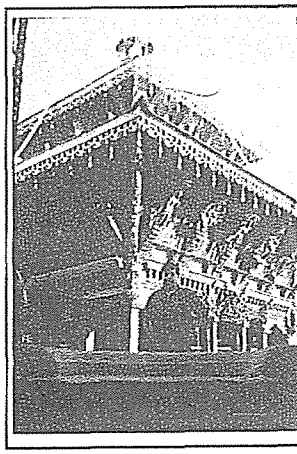
ELEVATOIN OF TRADITIONAL NEWRAI HOUSE

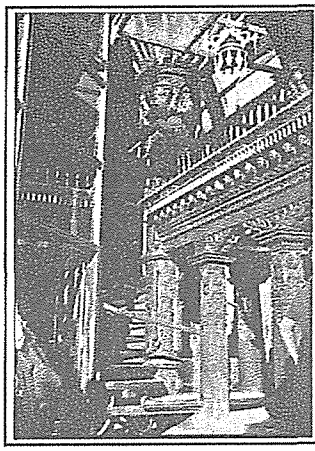
HANNOVER EXPO 2000

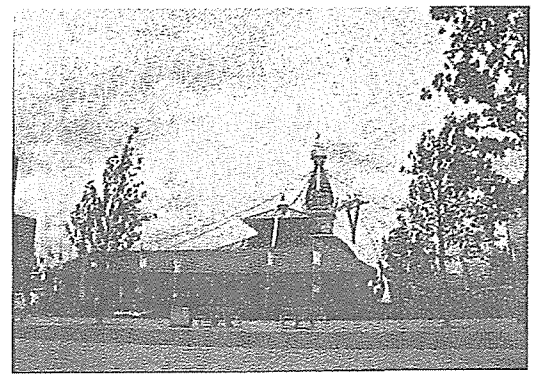


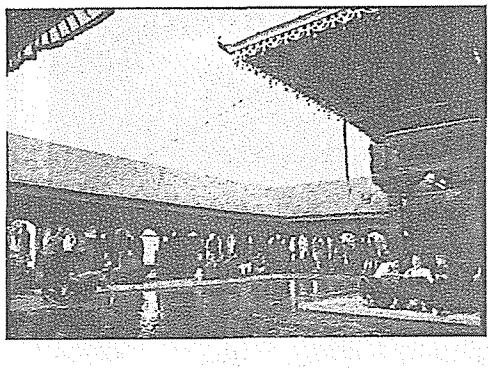
HIMALAYAN MANDAPA

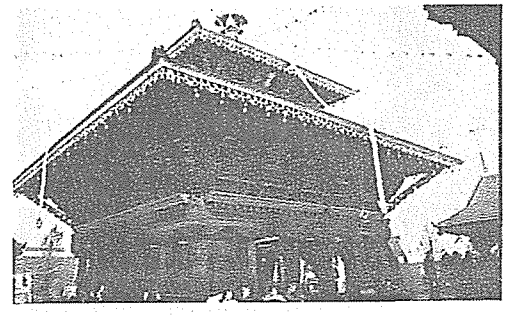


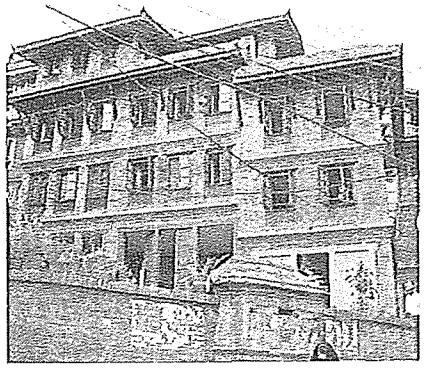








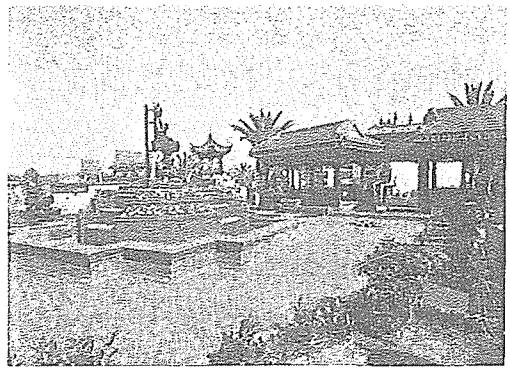




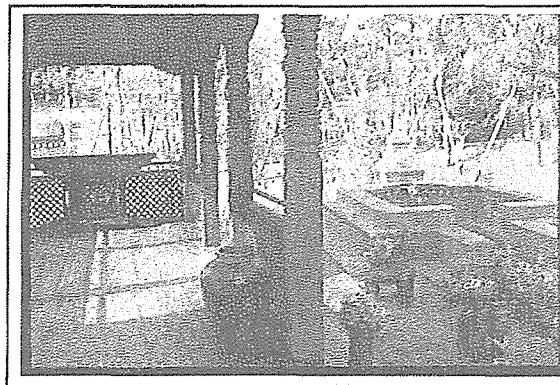
PUBLIC BUILDING TREATED WITH TRADITIONAL WOODEN ARCHITECTURE IN FRONT FAÇADE WITHIN HISTORICALLY PROTECTED ZONE(BHAKTAPUR DURBAR SQUARE)

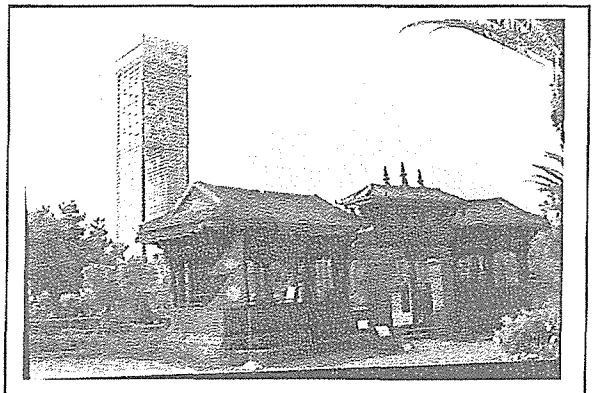
FLORA EXPO , HAMAMATSU,

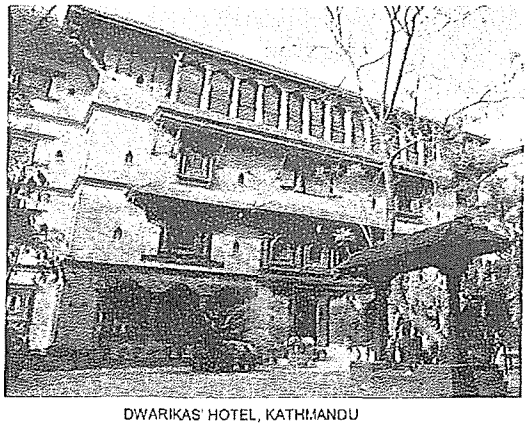
JAPAN 2004



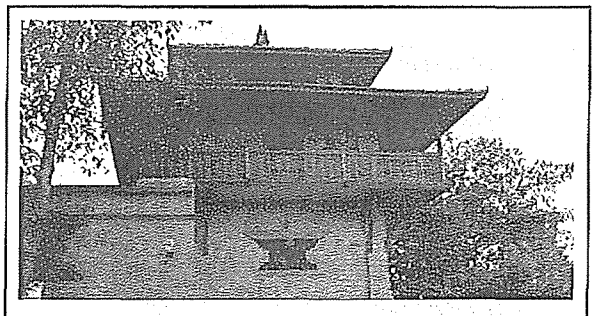
ENLIGHTMENT GARDEN







DWARIKAS' HOTEL, KATHMANDU



A RESORT IN NAGARKOT

8. Current State of Wooden Architecture in the Philippines

Mr. Joseph Alexander De Guzman Jàvier

Filipino Wooden Architecture – A Fading Art
フィリピンの木造建築 ～薄れ行く芸術～

Introduction of the Philippines (00:00:00 - 00:05:00)
- Geography and Climate
- Culture and History
- Economy and Industries
- Art and Architecture

History of Philippine Wooden Architecture (00:05:01 - 00:15:00)
- Pre-Historic Period (Late Bronze Age – 1000s)
- Pre-Hispanic Period (1000s – 1500s)
- Hispanic Period (1500s – 1800s)
- American Occupation (1900s – 1940s)
- Japanese Occupation (1940s)
- Modern Period (1950s – 2000s)

Current State of Philippine Wooden Architecture (00:15:01 – 00:20:00)
- Local Hard Wood Species and Current Uses
- Popular Applications of Wood in Philippine Modern Architecture

Challenging Issues of Philippine Wooden Architecture (00:20:01 – 00:25:00)
- Environmental Impact
- Government Logging Restrictions
- Sustainability and Practicability
- Competition with Other Materials
- Lack of Skilled Wood Artisans and Fine Carpenters
- Absence of Standards of Methodologies and Procedures

フィリピンという国（所要 5 分）
・地形と気候
・文化と歴史
・経済と産業
・芸術と建築

フィリピン木造建築の歴史（所要 10 分）
・紀元前（後期青銅器時代～1000 年代）
・スペイン統治以前（1000 年代～1500 年代）
・スペイン統治時代（1500 年代～1800 年代）
・アメリカ統治時代（1900 年代～1940 年代）
・日本統治時代（1940 年）
・近代から現代（1950 年代～）

フィリピン木造建築の現状（所要 5 分）
・国内における広葉樹の種類と現在の使用状況
・フィリピンの現代建築における木材の主要用途

フィリピン木造建築の課題（所要 5 分）
・環境への影響（環境インパクト）
・伐採を制限する政策
・サステナビリティと実行可能性
・他の材料との競争
・熟練した職人や大工が少ないこと
・理論的、実際的な方法が標準化されていないこと

International Forum on Wood Architecture
Current State of Philippine Wood Architecture
Philippine Wood Architecture – A Fading Art
Arch. Joseph AdG Javier, UAP

Introduction to Presentation and Personal Credentials (-00:01:15 - -00:00:01)

00:00:00

Introduction of the Philippines (00:00:00 - 00:08:54)

- Geography

The Philippines is a country located at the south-east region of Asia. It has a total land area of 300,000 square kilometres. It is bounded by Taiwan at the north, the Pacific Ocean at the east, Indonesia and Malaysia at the south and the South China Sea at the west. It is an archipelagic nation with 7,100 islands, grouped into Luzon, the largest and northern-most island; the Visayas, a cluster of islands at the central part of the archipelago, and Mindanao; the second largest island and southern-most part of the country. Manila, the capital city, is located in the island of Luzon at the northern part of the country.

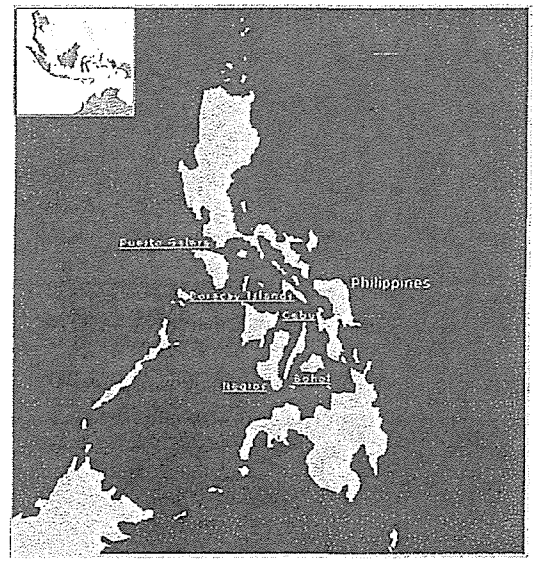


Figure 1: Philippine Map

00:00:46

- Climate

The Philippines has a tropical climate, with dry and searing summers from March to June; hot and humid monsoons from July to November, and cool and drizzling holidays from December to February. The climate of the country is generally humid and warm. The most pleasant time of the year is from December to February when the weather is milder and cooler.

00:01:09

- Culture

Filipinos are predominantly of Malay descent, with very strong Chinese and Spanish racial influences; all from various waves of Chinese trade missions and migrations; and from the 300-year rule of Spain. Most Filipinos have Spanish surnames because of the imposition of these surnames to the first names of the early


Figure 2: Filipino Kids Laughing

Filipinos, who, like the Native American Indians, derive names from descriptive and narrative words taken from personal characteristics or from their natural environment. A good section of the population also has Chinese surnames from the immigrants who came to the country during the early 19th century.

00:01:52

Figure 3: Manila Cathedral

The population is dominantly Christian. Islam is more popular in the island of Mindanao. The Filipinos generally have a west European culture, similar to those of the Latin American countries. But, like most island nations in the Pacific, life is laid-back and relaxed, with a strong sense of humour. In fact, for the Filipinos, humour is a powerful insulator in situations of national and personal tragedy and humiliation. Traditional cuisine, architecture, literature, music, visual arts and drama are mostly influenced by Spain.

00:02:32

Business and family culture in the Philippines are mostly influenced by the Chinese, as with cuisine and superstition. Popular and modern culture is heavily influenced by the Americans most evident in the cinematic and broadcast arts. The official languages are Filipino and English, with English flourishing in the metropolitan capitals of Manila and Cebu. The Filipino language is characterized by a healthy smattering of Spanish, Chinese and Indian words within a Tagalog language bed.

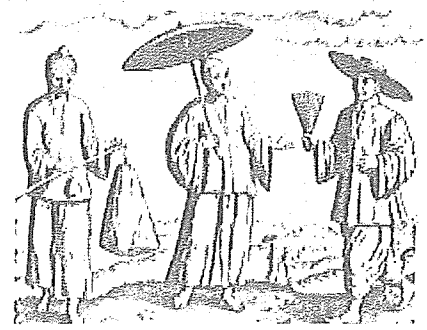


Figure 4: Chinese Traders

00:03:05

- Politics and Government

The government is presidential and unitary, with the president as the head-of-state, head-of-government and commander-in-chief of the armed forces. Laws are formulated by a bicameral congress, members of which are all popularly elected, together with the president and vice-president.

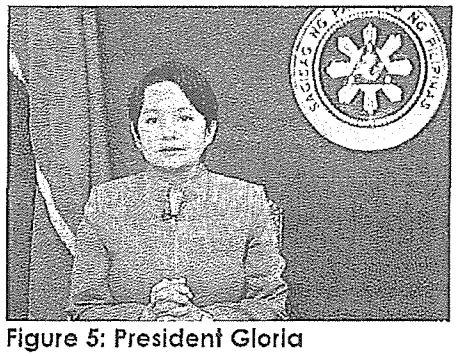


Figure 5: President Gloria Macapagal-Arroyo

00:03:27

- History

The Philippines experienced several waves of migrations from the Australian-Polynesian region, as well as from the Malaysian-Chinese region.

Figure 6: King Philip II of Spain

About 2500 BC, Malayo-Polynesian immigrants settled in the country, making them the ancestors of the modern Filipinos. By the 1000s to the 1300s, trade relations with the Indians and Chinese have been established. Spain colonized the country at the early part of the 1500s, from which they established formal systems of government and religion. The name "Philippines" itself was a tribute to the Spanish King Philip II. By the late 1800s, the Philippine Revolution started and culminated in the declaration of independence in 1898. Soon after, though, as a result of the American-Spanish War, the Philippines was ceded to the United States. As the new colonizers, the Americans established formal educational systems. By the middle of the 1900s, Japan invaded the country and settled for five years until World War II ended in 1945. The Japanese had little influence due basically to the very turbulent episode of war at those times. Full sovereignty was granted the country by 1945 and from then on, the Philippines governed itself with a succession of Filipino leaders up until the present day.

Figure 7: General Douglas MacArthur during the American Liberation

00:05:03

• Economy and Industries

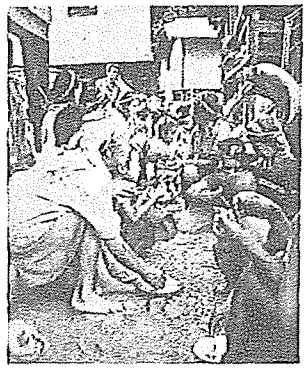


Figure 9: 40% of Filipinos Live Below the Poverty Level

The Philippines is a developing economy with a massive agricultural and service sector base. It has a very healthy business process outsourcing industry that has clients from Europe and the United States. 40% of the population remain to be poor with an average daily family income of only USD2.00. In recent years, however, the economy has been showing promise but needs to have its gains to trickle down to the lowest 40% of the populace. Income inequity remains very high despite the improving economy, thereby forcing an exodus of skilled and talented workers and professionals to work abroad and leaving the local economy with a deficiency, most particularly in the sectors of health, education, engineering and construction.

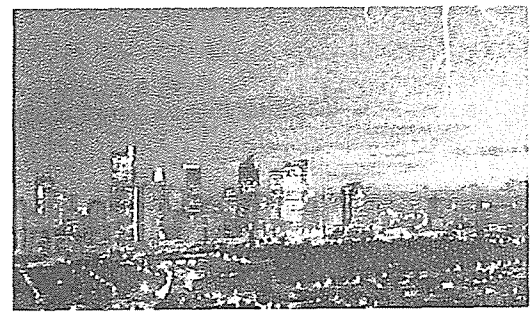


Figure 8: Makati Skyline

00:05:56

• Art and Architecture

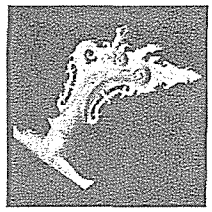


Figure 11: Maranao Gold Sword Handle

Indigenous pre-colonial Philippine art and architecture is very communal and religion-based, with little emphasis on self-celebration. Most artefacts and architecture are a celebration of nature and community. Pottery, jewellery, garments, armaments and sculpture are the most popular forms of the pre-colonial arts, while spoken literature, dance and music are for the performing arts. Architecture, as a major body of art, depicts more of the communal buildings such as rice granaries, council houses and worship houses. Residences are secondary to the chieftain's residence, and are sparsely decorated as with most tribal architecture.

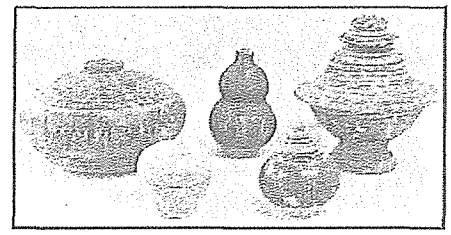


Figure 10: Ancient Philippine Pottery

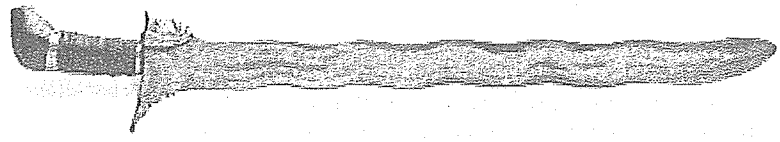


Figure 12: Maranao Sword

00:06:45

Art and architecture in the Spanish era are more into the late Romantic style with foliage-inspired decorations and motifs. Residential, institutional, and sacred architecture flourished in this era. Theatre and drama flourished in this period likewise, side-by-side with painting and written literature. The Americans, however, promoted the Neo-Classical style of architecture with special emphasis on government and educational buildings. The cinematic arts saw foothold in this era where Hollywood became a very strong reference point.

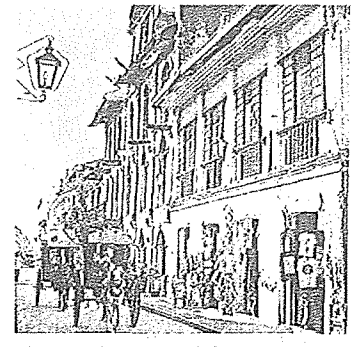


Figure 13: Spanish Houses in Vigan City

00:07:22

Philippine art and architecture now is very international in character with a strong reference to its pre-colonial roots. Domestic architecture had, for a time, been within the Mediterranean Renaissance style, but has now shifted to the Asian Minimalist styles. Japanese influences in architecture came in rather belated considering their time of influence

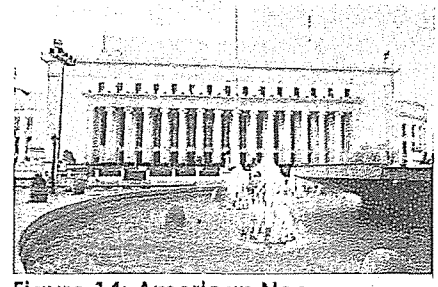


Figure 14: American Neo-Classicism in Manila

was in the 1940s. Minimalist or "Zen" architecture in the modern style of Tange Kenzo and Ando Tadao found its way in the 21st century domestic architecture, but decorated with Filipino traditional artefacts. Commercial, government and educational architecture are within the lines of the American Modernist styles. Art is quite within the popular context of social and political commentaries in the form of paintings and sculptures. Music and cinema are dominantly in the Hollywood and MTV mould. Legitimate theatre is not too prevalent and is only within the reach of the art-oriented and academe. Fine art and fine architecture all remain to be within the exclusive access of the wealthy and the informed. The lower classes of the Philippine society are too distracted with their day-to-day chores of earning a living than to spend a few hours watching theatre or hire an architect or interior designer to beautify their homes in the latest styles. Puritan and stylized Filipino art and architecture are championed by a few. These few however are in the forefront of a resurgence of the Filipino spirit in the wake of a genuine or artificial economic uptrend that has been observed in the last few months. Like all pure cultures, the Filipino style has been diluted in the dominating American and Chinese styles, both of which belong to a mightier and controlling economy.

Figure 15: MTV Pilipinas

00:08:54

History of Philippine Wooden Architecture (00:08:55 - 00:17:22)

- Pre-Historic Period (Late Bronze Age – 1000s)

As the early Filipinos within the Bronze Age were nomadic groups of people, they basically lived in shelters that were ready for their use like caves and natural formations. Hunters and fishermen lived in "lean-to" structures. It is a simple shed type construction with dried leaves for a roof and bamboo or tree branches for the structural frame. Flooring material is basically the same dried leaves similar to the roof.

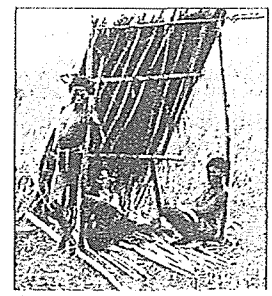


Figure 16: Lean-To House of Ancient Filipinos

00:09:30

- Pre-Hispanic Period (1000s – 1500s)

Early tribal kingdoms of Filipinos from the north to south used wood as their primary material of construction due to its abundance and ease of manipulation. The early forms of wood architecture of this period follow the "bahay kubo" or "cube house" from the Spanish word "cubo" for cube. The form is of a single


Figure 18: Bahay Kubo Structural Framing


Figure 17: Isneg House

room hut on stilts with slanted walls and high pitched grass roofs. Structural system is basically composed of four piles or columns planted on the ground with two connecting floor girders, transverse with three or four floor beams. The wall studs are slanted to form a basket-like cage that shall in turn support the roof frame of the same material. Cladding material is dried grass and tree barks.

00:10:23

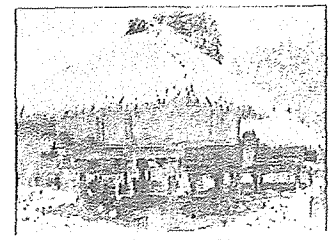


Figure 19: Ifugao House

Examples of these are the houses of the highland Ifugao and Isneg tribes of northern Philippines. The Ifugao House follows the "bahay kubo" or "cube house" architecture strictly with creative provisions for rodent protection at the columns. It is a single room house only for the use of the parents and infants. Children of age live in separate huts of the same construction.

00:10:50

Figure 20: Tagalog Bahay Kubo

The Filipino lowlanders of the central region had their huts closer to the ground and with more liberal additions of rooms and spaces. It has a gentler slope on the roof with dried palm leaves for wall panel cladding.

00:11:05

Figure 21: Torogan House of the Maranao Sultanate

The royal Islamic sultanates of the southern Philippines had a more advanced hut architecture. Embellishments can be found on columns and beams indicating the status of the occupant. Examples of this type are the Torogan House. Beam terminations mimic the tail feathers of the Sarimanok, a legendary magical rooster that brings good fortune.

00:11:29

Figure 23: Badjao House

The sea-faring Badjao and the Samal tribes of southern Philippines have their huts on water but with basically the same design and construction principle. Some Badjao houses are directly built on a boat

Figure 22: Sarimanok

instead of stilts.

00:11:45

- Hispanic Period (1500s – 1800s)

Figure 24: Crisologo Street, Vigan City

Wood architecture in the Spanish era flourished basically in the residential sector. Some government buildings and churches were made out of wood but most were predominantly of stone and mortar. Fine examples of these are the Filipino ancestral houses in provinces fashioned after the Spanish "casa" and the Italian "palazzo". The vernacular at that time called it "bahay na bato" or stone house, in reference to its difference from the regular island hut or "bahay kubo". The "bahay na bato" however had its entire second floor made out of wood. The houses in Crisologo Street in Vigan City, Ilocos Sur are fine examples of Spanish residential architecture at its height in the Philippines. The ground floor was basically made from stone while the second level was of timber and planks. Roofs were normally of dried grass but were later replaced with steel sheets in the 1900s.

00:12:54

Another fine example is the Lizares House in Talisay, Negros Occidental. It has the traditional form of the "bahay na bato" with short eaves parroting their counterparts in Madrid in glaring neglect of the tropical considerations of the local setting.

00:13:11

Figure 26: The Aguinaldo Mansion

00:13:32

The Aguinaldo Mansion in Kawit, Cavite Province, the residence of the first Philippine president is adorned with a prominent carabao under its main balcony. It has a watch tower at the intersection of the two main portions of the house. This is the house where the Philippine flag flew for the first time.

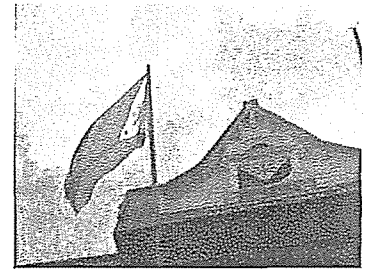


Figure 25: Site of Philippine Independence

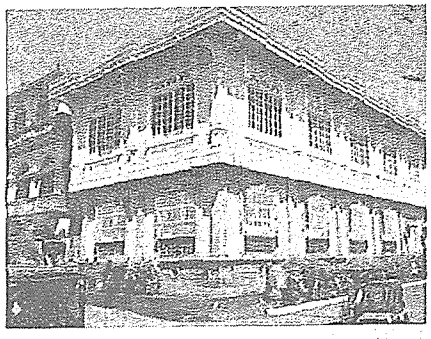


Figure 28: Rodriguez Mansion

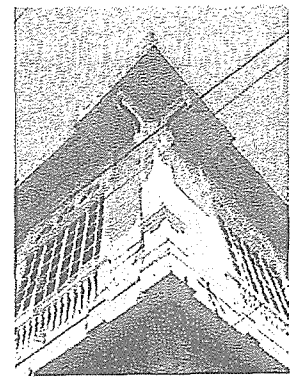


Figure 27: Corner Detail

• American Occupation (1900s – 1940s)

During the American occupation, wood architecture continued in the form its Spanish predecessors took but with heavier consideration for localised décor in defiance of the Spanish rulers of the last century. Décor and motifs of Philippine flora and fauna came into being in recent houses. Examples like the Rodriguez Mansion in Sariaya, Quezon Province shows American influences with stars and Victorian flora that were quite typical of American plantation houses of that era.

00:14:08

Another House in Wood lattice plantation the criss-cross the planter windows and windows use small-paned shell windows of the Spanish houses.

Figure 30: Baldomero House

example is the Baldomero Kawit, Cavite Province. work reflect American house characteristics like panel at the ground floor, boxes at the second floor the large paned glass where before they would

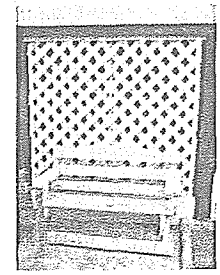


Figure 29: Lattice Work at Baldomero House

00:14:31

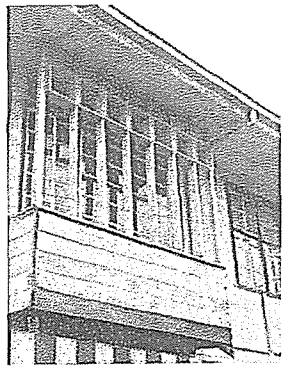


Figure 32: Modern Wood Window Screen

• Japanese Occupation (1940s)

The Japanese period saw the emergence of the Bauhaus style wood houses, with clean lines, low pitched roofs, large windows and multi-level floors. The destruction brought about by the war resulted in the permanent demolition of some of the finest examples of Spanish and American architecture. Since the business of the Japanese occupants were of warfare, little cultural exchange between the Japanese and the Filipinos happened save for the permanent stamp on the national

Figure 31: Bauhaus Type Wood House

psyche of what is essentially Japanese: simple, clean and austere. This collective psyche will come into head 70 years later in the early 21st century through the modern Asian Minimalist houses of the wealthy. Good appreciation of empty, clean and quiet spaces will be best manifested in recent works of Filipino architects, most especially with resort architecture. Wood in these houses, however, will be relegated to mere décor and appliqué.

Figure 33: Typical Filipino Wood House. Circa 1960s

00:15:38

- Post-War Period (1950s – 1990s)

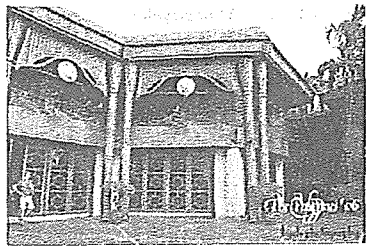


Figure 34: The Coconut Palace

Upon the end of the war, and the declaration of full sovereignty from the Americans, the business of reconstruction began. Filipino architects educated in the United States imported their new-found building technology: reinforced concrete, steel and glass. Suddenly, wood is a prized and rare material; leading to the 21st century with the selective prohibition of logging in the entire country. Wood for construction are now imported from Malaysia and Indonesia, and on some instances, from Finland, Australia and Canada. Architecture took on a very generic international look but some architects were still able to build notable wood architecture featuring terrific Filipino designs during the 1980s and 1990s.

Figure 36: Coconut Palace Pool Courtyard

00:16:36

One good example is the Coconut Palace in Manila, by Arch. Francisco Manosa, a giant in Philippine architecture who continues to champion the evolution of puritan Filipino architecture. He calls this palace "Tahana'ng Filipino" or Filipino Home. This palace was built for visiting local and international guest artists and performers of the Cultural Centre of the Philippines. It was commissioned by the infamous former First Lady Imelda Romualdez – Marcos. The palace is built mostly out of coconut products, from the trunk for columns, coconut fibre for carpets, coconut wood for

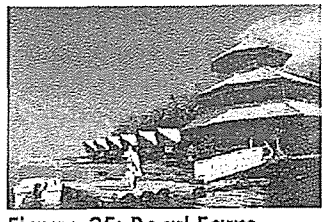


Figure 35: Pearl Farm Resort

floors to the coconut shell for roof tiles.

00:17:01

Another example of current applications of wood architecture is the Pearl Farm in Samal Island, Davao Province. Of the same designer as the Coconut Palace, this project turned its attention to bamboo as mother material. Bamboo is used as roof tile, wall panel, floor board and ceiling panel.

00:17:22

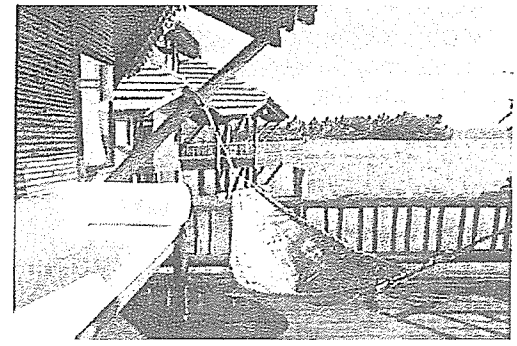


Figure 37: Pearl Farm Veranda

Current State of Philippine Wooden Architecture – Globalization Period (2000s) (00:17:22 – 00:24:02)

- Popular Local Wood Species and Current Uses

Philippine wood offers a wide range of uses from structural members to ornaments and decoration. Most species are abundant and accessible.

Kamagong

Kamagong or "Mabolo" is a fruit tree found only in the Philippines, the wood of which is extremely dense and hard, and famous for its dark color. It belongs to the ebony family of the genus Diospyros, and like many other very hard woods is sometimes called "iron wood". The word Mabolo is Filipino for hairy and describes the fruit's hairy exterior.

Figure 38: Kamagong Tray

The tree is grown for its rich-tasting fruit as well as its beautifully grained black timber, which is used in furniture making.

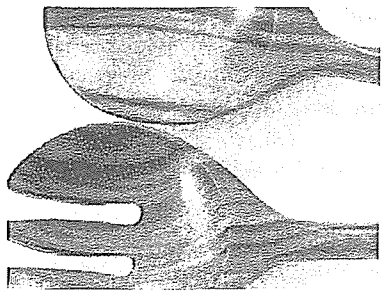


Figure 39: Kamagong Utensils

It is an endangered tree species and protected by Philippine law - it is illegal to export Kamagong timber from the country without special permission from the Bureau of Forestry, Department of Environment and Natural Resources.

Finished products from Kamagong wood, such as fine furniture and decoratives can be exported provided

that they are properly documented and approved by the Customs authorities

00:19:01

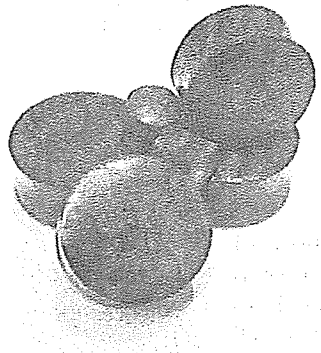


Figure 40: Narra Grain Canisters

Narra

Narra or Burmese Rosewood, is a tall deciduous tree that could reach 30 meters to up to 48 meters in places where it is indigenous. The hardwood, which is reddish, is termite resistant and rose-scented. The outer trunk is finely sliced to produce an extremely decorative veneer, used for decoration and in making of furniture.

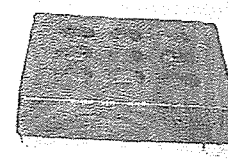


Figure 41: Narra Candle Holder

00:19:44

Coconut

The coconut tree is the most versatile tree in the Philippines, with every part of it offering a variety of uses from food, tableware, garments, building material to fuel. It is of the palm family and grows abundantly in tropical countries like the Philippines. Popular uses of this wood range from scaffold framing to decorative veneer.

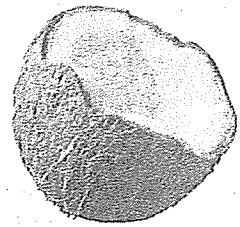


Figure 42: Coconut

00:20:04

Figure 44: Tanguile Tree

Tanguile

Tanguile or Lauan Red is another Philippine hardwood normally used for doors, door jambs, rafters, floor beams and girders and roof trusses. It has a reddish brown colour, mostly of the hard variety. It is termite and fungi resistant.

00:20:25

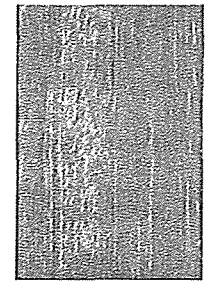


Figure 43: Tanguile Panel

Rattan

Rattan is a palm variety producing cane stalks used for furniture and martial arts armaments. It is common in Asia, Africa and Australia. It is similar to bamboo in appearance but has a solid stem. Rattan is generally processed to fibre or reed form, woven and made into home décor and furniture. It can also be used as wood panelling and ceiling material.

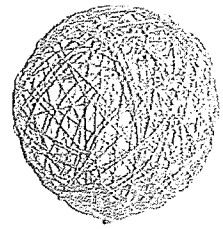


Figure 45: Rattan Ball

00:20:53

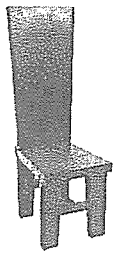


Figure 47: Molave Chair

Molave

Molave is endemic to the South and South East Asian region. A hard wood of yellowish brown colour, fine to medium graining and almost no odour, this wood offers good millwork handling. It is mostly used for general and finishing carpentry; and boat building as it is highly water resistant.

00:21:15

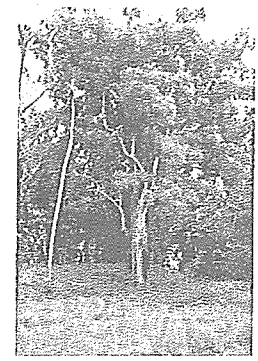


Figure 46: Molave Tree

- Popular Applications of Wood in Philippine Modern Architecture

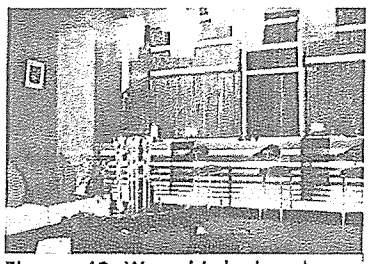


Figure 48: Wood Interiors in a Philippine Spa

Wood in the Philippines enjoys a popular acceptability as building material. However, in the residential sector, it is used only as ornamentation and wall panel. Wood as structural material is unpopular as more accessible and resilient materials like concrete and steel are more favoured. Most examples of pure wood construction in the Philippines are all old and dated, the last of which were constructed during the 1970s. Newer construction projects of predominantly wood material are all from the hotel and resort sector and some ultra high-end residential projects. Owners and clients of these projects have the resources, or access to hard wood. This reality of inaccessibility, therefore un-affordability makes it a luxury item in Philippine construction.

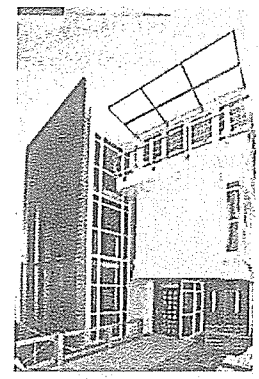


Figure 49: Wood Screen on an Ultra Modern House: Molinyawe Residence

00:22:16

Recently, imported wood from Finland which are pre-treated with preservative now offer new options for wood use. One example is the use of wood as louver screen material as is in this example of a

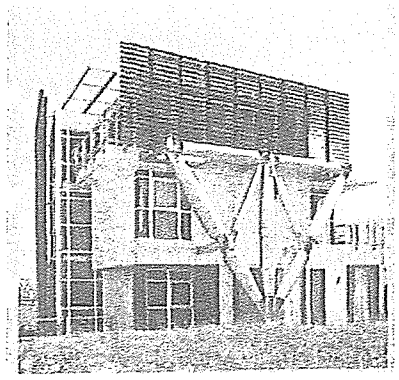


Figure 50: Molinyawe Residence - Wood Louver Screen Combined with Steel and Glass

modern residence in Manila. The Molinyawe House by Arch. Joseph Javier uses extensive applications of wood as screen material for the large windows. This offers sun and rain protection, and visual privacy to an otherwise very vulnerable window panel.

00:22:49

Other popular uses of wood are ceiling, wall and floor panels as in these residence projects by Manosa and Javier, the Lopez Pavilion and the Lontok House respectively. Wood combined with steel, glass and stone are the trend in high-end Modern Philippine residential architecture.

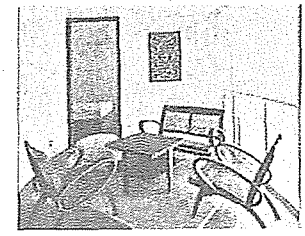


Figure 51: Lontok Residence Interiors - Mix of Wood, Glass and Concrete

Figure 53: Lontok Residence - Corner Detail

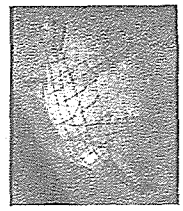


Figure 52: Lopez Pavilion - Bamboo Ceiling

00:23:06

One notable highlight is the project of Benjamin Reyes. This house uses rare Philippine hard wood as extensive structural material as well as finishing and decorative material.

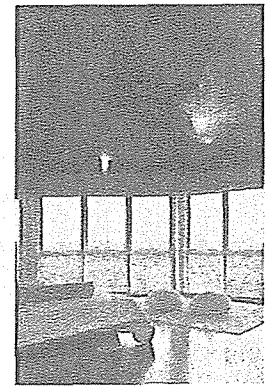


Figure 55: Lopez Pavilion - Wood Interiors

00:23:19

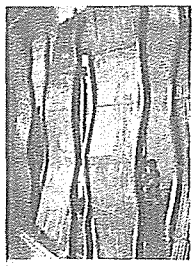


Figure 54: Reyes Atelier - Wood Decor

On the lower end of the market, wood and bamboo are still popular building materials but more on a temporary or transient basis; offering very little or no permanence at all. Bamboo, being cheap and accessible, is still a viable building material in the provinces especially in informal housing. Note that 40% of the Filipinos live under the poverty level, so poverty plays a very crucial role in the choice of building material. The middle class who can afford housing, but does not have the expendable income to buy an expensive and luxurious material such as hard wood, settle for the affordable concrete and steel.

00:24:02

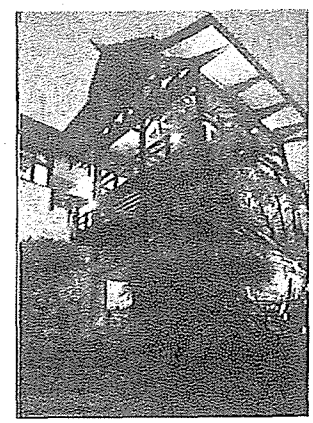


Figure 56: Reyes Atelier - Wood as Structural Member

Challenging Issues of Philippine Wooden Architecture (00:24:03 – 00:27:18)

- Environmental Impact and Government Logging Restrictions

Figure 58: Bamboo as Screen Material

The use of wood in the Philippines is practically discouraged with the imposition of a total log ban in 2004 and a soft-pedalled selective log ban in 2005. This particular presidential decree was brought about by the Ormoc City tragedy in 1991 where five thousand people died from the flash floods that resulted from the massive deforestation in the province. From then on, most wood is bought from either the importers or the black market. This black market still manages to source wood from the now-restricted forests and sell them on the sly through political patronage and corruption.

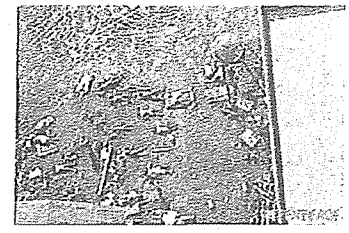


Figure 57: Ormoc City Flood Kills Thousands

00:24:52

Figure 59: Forest Denudation

- Sustainability and Practicability

Due to the weakness of programs to promote the sustainable use of timber and wood in the Philippines, wood is scarce and therefore expensive. Being an expensive material, it loses its popularity as a practical building material. Its practicability is also diminished with the mis-conception that it is a non-durable material, needing high maintenance and attention.

00:25:23

Figure 60: Typical Middle Class Filipino House in Concrete

- Competition with Other Materials

With the development of reinforced concrete and steel, these materials have now overtaken wood as a viable building material. Concrete, most especially, is very affordable and accessible that compared to wood, it takes priority as a material of choice in the design and specification stages of any housing project. Other materials such as fibre cement boards and mineral boards now replace plywood and ply boards as panelling material for walls, floors and ceilings in modern city houses.

00:26:00

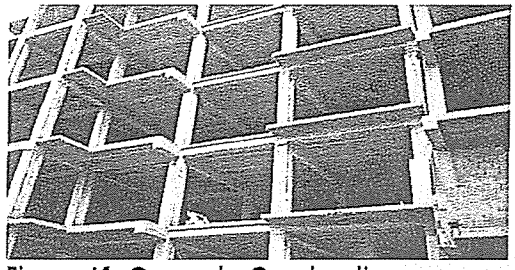


Figure 61: Concrete Construction

- Lack of Skilled Wood Artisans and Fine Carpenters

With this slowly fading popularity of wood as a main building material, artisans and fine carpenters now also surely shift to other more popular building methodologies. This development makes them forget and eventually lose their skill in fine carpentry. Fine artisans are now just employed by furniture makers and home ware shops.

00:26:28

- Absence of Standards of Methodologies and Procedures

The Philippines generally does not have any standard of building methodologies and procedures for wood construction. Details and connections are normally copied from architectural books imported from the United States, which normally do not conform to tropical climate conditions. If not from these books and references, architects and builders the design unique and particular details themselves. These data however are not collected to form part of a national standard of methods and procedures. Wood sizes and lengths are still measured in the Imperial system while the building industry measures and reads in the Metric. This difference in units and systems of measurements result in considerable material wastage and loss.

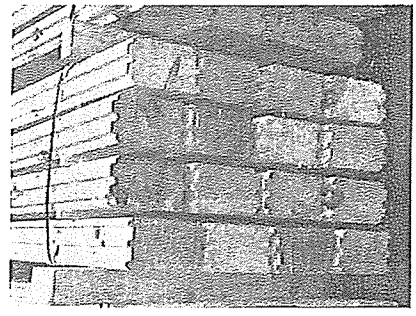


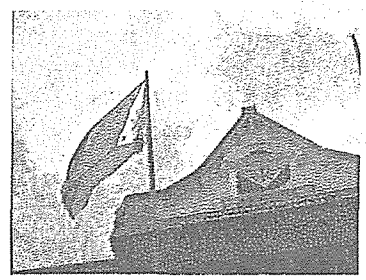
Figure 62: Wood Sold in the Imperial System of Measurement

00:27:18

Conclusion (00:27:19 – 00:28:30)

The Philippines' pure and indigenous architecture used wood as its mother material. It flourished and propagated using this medium despite various invading and conquering cultures that came and went. Likewise, the Philippines enjoy a vast pool of talented and skilled designers, artisans and carpenters that can or may specialize in wood construction. Wood construction can still have a revival in the Philippines provided strong

government support is present. Sustainable and practical programs on hard wood specie propagation, felling, milling and distribution are some of the answers to a slow but sure revival of wood architecture in the Philippines. The private sector also needs to contribute, most especially the architects and interior designers, to promote within their industry more pure forms of Philippine architecture. In doing so, since the pure Filipino design language is best expressed in timber, the use of wood, together with new emergent materials can blend, forming a dynamic new avenue for the evolution of the use wood and more particular, the use and appreciation of Filipino architecture itself.



00:28:30

Extro to Close (00:28:31 – 00:30:00)

Sources:

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Photographs:

- Chester Ong
- Neil M. Oshima
- Joseph AdG Javier

Acknowledgements:

- Arch. Medeliano Roldan, FUAP
- Arch. Francisco Manosa
- Arch. Johanna Macasieb
- United Architects of the Philippines – Alabang Chapter
- Ms. Angela Sazon
- Ms. Katrina Joyce Wabinga
- Javier Design Studio
- Mr. Koichi Sakai
- Ms. Donna Viernes
- Ms. Bing Miranda
- Ms. Marian Espinosa – Labad
- Madame Encarnacion Sapinoso - Hocson

９．中越地震被災地・山古志における風土に根ざした復興住まい・まちづくり

三井所　清典　教授

「中越地震被災地・山古志における風土に根ざした復興住まい・まちづくり」

.芝浦工業大学　名誉教授　三井所　清典

1．2004年10月23日午後5時56分　中越地震が発生した。

2．震源地は新潟県川口町の地下13kmである。

3．地震の強さは最大震度7、M6.8。地震加速度1500～1600ガルで、12月28日までの震度5以上の余震が19回もあったという特徴のある大地震であった。

4．中越地震の建物への被害は次のとおりである。

全壊	3,185棟
大規模半壊	2,158棟
半壊	11,557棟
一部損壊	103,497棟
合計	120,397棟

5．旧山古志村（現在は市町村合併により、長岡市山古志）は、震源地川口町に隣接する中山間地で、各所で地盤崩壊、地辷り崩壊が発生し、住宅等の建物、道路・河川等のインフラ、棚田・棚池等の農業・漁業の生産用地に大きな被害が生じた。

6．山古志村の住宅被害は、全壊339棟、大規模半壊73棟、半壊223棟、一部損壊112棟で、全壊率45%、被害のない住宅は一軒もなかった。

7．山古志村の人口は震災時点で2,168人、高齢化率は35%である。

8．また14集落のうち、地盤崩壊や河道閉塞でもとの集落地に住宅を再建できない2集落は、集落毎移転する必要が生じ、4集落では大規模な住宅地再生が必要となった。

9．このような状況下で、自力再建が困難なケースが少なくないことから、長岡市では住宅計画の専門家や地元大学、地元建築等関連業界と連携して「長岡市中山間地型検討委員会」を設置し、再建者の意向把握に努めつつ、復興住宅のモデルプランの作成や供給体制の検討等を行った。

10．また、検討成果の住まいの普及を図るため、中山間地型復興住宅／住まいづくりの手引書の作成・配布、復興モデル住宅の建設・公開を行った。

11. このように再建者と地元の建築士・工務店・行政が綿密に連携し、再建者の安心を確保しながら、山古志にふさわしい中山間地復興住宅の建設を進めている。2007年3月までには、ほぼ終了し、仮設住宅からの移転も一段落する予定である。

12. また、地元工務店の協力やキッチン、ユニットバス、サッシ等の部品メーカーの協力があり、さらに新潟県の復興基金の活用により、低価格化を実現することができた。

13. なお、高齢や障害等の理由で自力再建できない住民に対して、長岡市は中山間地型復興住宅の仕様と共通する公営住宅を計画設計し、建設している。

14. 山古志の公営住宅は、居住者の地域コミュニティーと深く関わっている日常生活を配慮して、それぞれの居住集落地区に現時点で必要な住戸を散在的に配置しているのが特徴的で、戸建、2戸1棟建、4戸連棟建がある。

15. 長岡市は今後の山古志の山のくらし再生を日本の中山間地再生のモデルとして、推進していくことを想定しており、自立再建の復興住宅も公営住宅としての復興住宅も、その期待に応える性能・質・仕組みをもつ住宅として供給できたと思っている。

16. テーマにつけた「風土に根ざした」とは、山古志の気候や文化や産業に適合するという意味である。

17. 震災前、山古志村ではほぼ集落に1人ずつの大工・棟梁がいて、村の住まいの増築、改築、修理及び新築に対応した。

18. 山古志の住まいの復興は約半数が改修、半数が新築と予想したが、現実には3割が帰村しなかったので、改修が2/3、新築が1/3の比率となった。

19. 改修であれ、新築であれ、山古志村の住宅を維持する役割は山古志村の大工達であることが望ましいと考え、新築住宅も改修住宅と同じ大工達の技術、すなわち在来構法で建設できるよう設計した。

20. また新築住宅の1階、2階で間仕切壁や建具がなく、さらに床・壁天井の仕上げをしないことにした。

21. 山古志で地元の大工たちのすまいづくりの仕事が継続し、後継者も生まれるようになると,
そういう職人たちの力によって山古志の住まいや集落が健全に維持されることになる。

22. 私はこのように社会構造として大工達の生業を継続させることを「生業の生態系の保全」と呼んでいる。

23. ２０世紀後半には日本では工業化が極度に進展したため、手作業を主とする多くの生業が絶滅の危機に瀕している。しかし、山古志のような地域の住まいや集落を維持するためにはローテクニックの生業を維持することが持続可能な地域社会（サスティナブル・コミュニティ）を作る上で大切なことである。

"Restoration of Yamakoshi after the 2004 Mid -Niigata Prefecture earthquake:
Rebuilding houses and the community"

Professors emeritus at Shibaura Institute of Technology
Kiyonori Miisyo

1. Mid-Niigata Prefecture earthquake occurred at 5:56pm, 23rd Oct 2004.

2. The seismic centre was 13 kilometers below Kawaguchi-town, Niigata Pref.

3. The intensity of the earthquake was about 7 (maximum seismic intensity) and 6.8 in magnitude. The seismic accelerated velocity was 1500-1600 gals. It was an especially huge earthquake, with more than 19 aftershocks, with seismic intensities of five or more.

4. Damage to buildings in the mid Niigata Earthquake is as below:

Total collapse	3,185 bldgs.
Major collapse	2,185 bldgs.
Half collapse	11,557 bldgs.
Partial Damage	103,497 bldgs.
Total	120,397 buildings

5. Ex - Yamakoshi-village (which is now called Yamakoshi, Nagaoka-city) is hilly and mountainous, located next to the seismic centre, Kawaguchi-town. There were a lot of cave-ins of land area and landslides all around the village. There was serious damage to the infrastructure, such as to houses, roads, rivers and industrial fields of agriculture, such as terraced rice paddies. The fishing industry also suffered damage to their ponds, etc.

6. Damage to houses is broken down as follows; total collapse: 339, major collapse: 223, partial collapse: 112. There were no dwelling houses that were not damaged.

7. The population of Yamakoshi-village was 2,168 on the day of the earthquake, and the percentage of aged people (over 65 years old) was 35 percent.

8. Among 14 areas, it became necessary for people in 2 areas to move to other areas, one-by-one, because their houses couldn't be rebuilt in the original location because of collapse of land and because a nearby river was dammed up. Large-scaled housing renovation was required for 4 areas.

9. As there have been quite a few cases where inhabitants couldn't reconstruct their houses at their own expense, Nagaoka-city created the "Committee for Rebuilding Housing in Hilly and Mountainous Areas in Nagaoka-city", in cooperation with experts on housing and from local universities, or those engaged in the local construction industry.

10. In order that housing that is a result of research might be put to practical use in the future, the city made guidebooks for repairing and rebuilding houses. The guidebook titled "Rebuilding Housing in Hilly and Mountainous Areas" is distributed, and models of the houses are exhibited.

11. Original residents have been repairing and rebuilding their houses in close cooperation with local architects, builders, and the city administration. And they also cooperated in ensuring the peace-of -mind of the affected people. Everything will be completed by March 2007, with the move from temporary houses being the first stage.

12. The residents have been able to get good prices through the cooperation of local builders and makers of kitchens, unit-baths, sashes, etc, by receiving the funds from Niigata prefecture.

13. Nagaoka-ciity has designed public housing with common specifications for repairing and rebuilding houses in hilly and mountainous areas, and they have constructed some houses for those who couldn't carry out the work on their own because of age or disability.

14. It is a unique characteristic of public housing in Yamakoshi that the lay-out of the necessary units is well planned throughout each area, taking daily lives of closely related inhabitants into consideration. There are single-family detached units, two-family, and four-family units.

15. Nagaoka-city believes that their rebuilding plan in this rural area on a mountain side will serve as a model case for future restoration in hilly and mountainous areas. The people take pride in rebuilding their houses on their own and the fact that their government rebuilt houses which meet the requirements of that model regarding performance, quality, and systems.

16. The phrase in the title "appropriate for the vernacular circumstances" means that they match the climate, culture, and industry of Yamakoshi.
17. Before the earthquake, every area had a carpenter or master builder to meet the requirements of residential work, such as additions, rebuilding, repairing, and new construction all around the village.

18. We assumed that restoration of housing in Yamakoshi-village would involve almost equal parts of rebuilding and new construction. But as 30% of original inhabitants didn't return to the village, that consist of 2/3 of rebuilding and 1/3 of new construction

19. We believe that it should be carpenters in Yamakoshi-village who play the role of maintaining the housing in the village by rebuilding and new construction. Because of this, we designed both new houses and rebuilt houses with the same techniques of the local carpenters.

20. We designed the first and the second floors of newly constructed houses with no partition wall and doors, and uninished floors and walls.

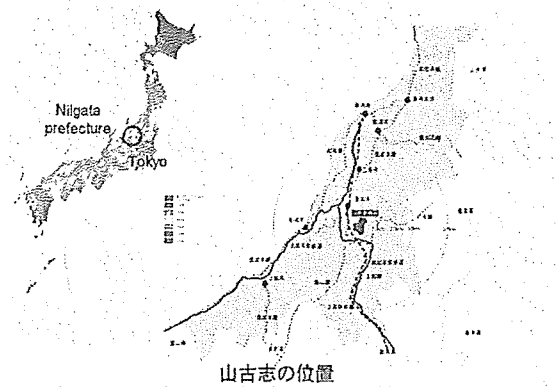
20. As construction of housing by local carpenters continues, and carpenters hand over their careers to their successors, housing and communities in Yamakoshi are going to be well maintained by craftsmanship.

22. I think this kind of succession work of the community of carpenters as components of the social system: "Maintenance for ecology of job for the community".

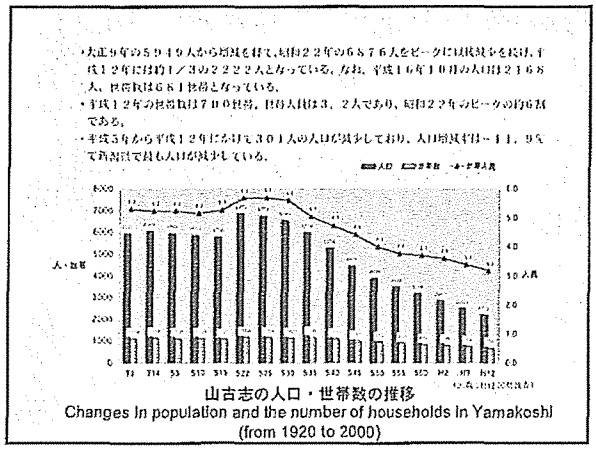
23. In the late 20th century, Japan was industrialized so rapidly that a lot of jobs in Japanese communities, such as manufacturing, are threatened to become extinct. In order to maintain the housing and community in areas like Yamakoshi, it will be important to support the basic industry for the community for keeping sustainable community.

中越地震被災地
山古志における
復興住まい・まちづくり
Restoration of Yamakoshi after the 2004 Mid-Niigata Prefecture Earthquake: rebuilding houses and the community

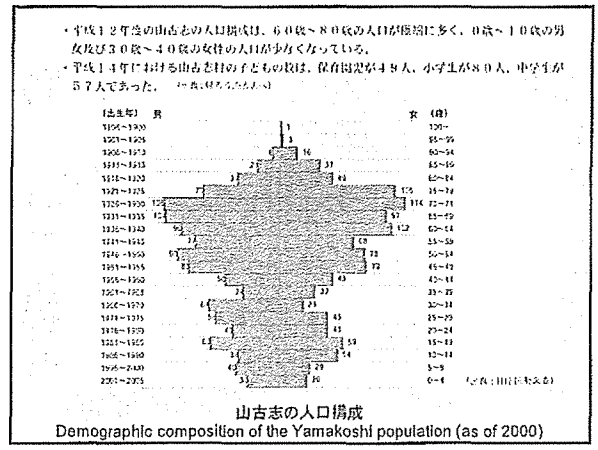
三井所　清典
Kiyonori Miisho



山古志の位置
Location of the Yamakoshi District in Nagaoka City (formerly Yamakoshi Village), Niigata Prefecture

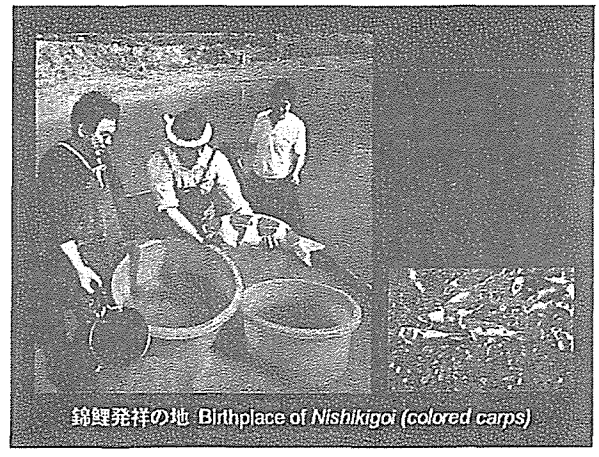


山古志の人口・世帯数の推移
Changes in population and the number of households in Yamakoshi (from 1920 to 2000)



山古志の人口構成
Demographic composition of the Yamakoshi population (as of 2000)

美しい棚田 Beautiful, terraced rice paddles



錦鯉発祥の地 Birthplace of *Nishikigoi (colored carps)*

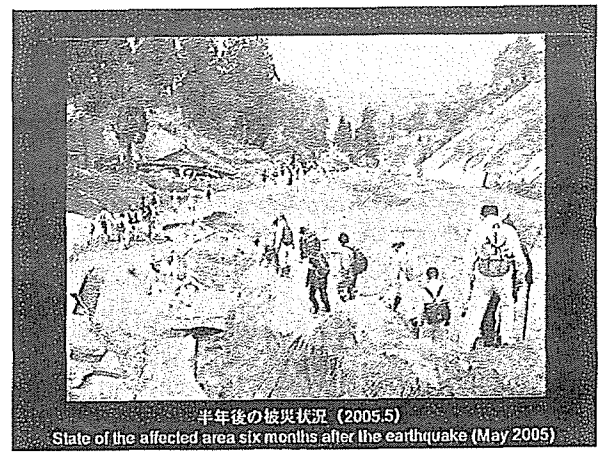
千年の歴史がある闘牛
Bullfight with a thousand-year history

夏の虫亀（むしがめ）集落
Mushigame Area in Yamakoshi in the summertime

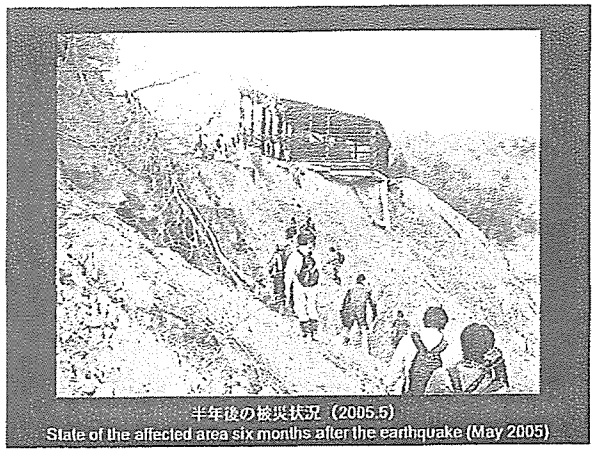
冬の虫亀（むしがめ）集落
Mushigame Area in Yamakoshi in the wintertime

震災前の楢木（ならのき）集落
Naranoki Area in Yamakoshi before the earthquake

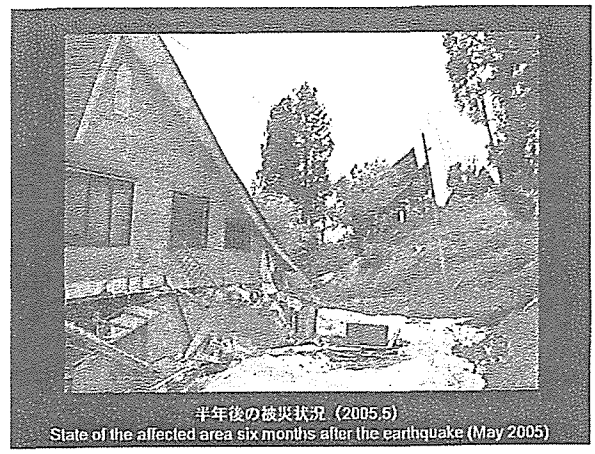
震災後の楢木（ならのき）集落
Naranoki Area in Yamakoshi after the earthquake



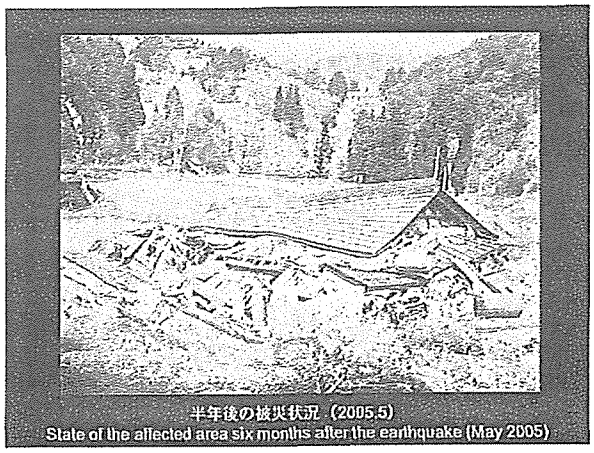
半年後の被災状況（2005.5）
State of the affected area six months after the earthquake (May 2005)



半年後の被災状況（2005.5）
State of the affected area six months after the earthquake (May 2005)

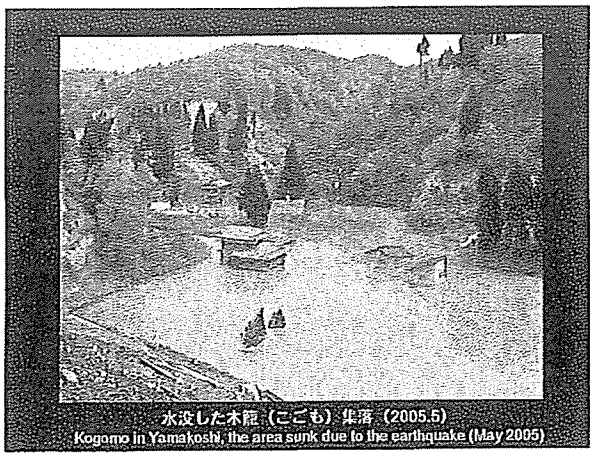


半年後の被災状況（2005.5）
State of the affected area six months after the earthquake (May 2005)

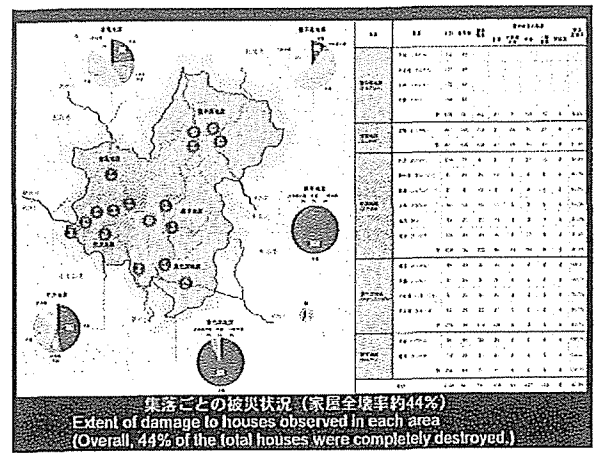


半年後の被災状況（2005.5）
State of the affected area six months after the earthquake (May 2005)

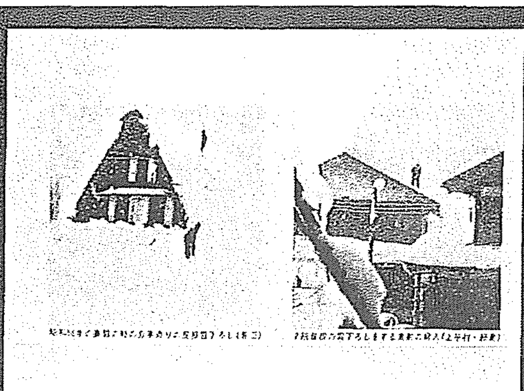
水没した木籠（こごも）集落（2005.5）
Kogomo in Yamakoshi, the area sunk due to the earthquake (May 2005)



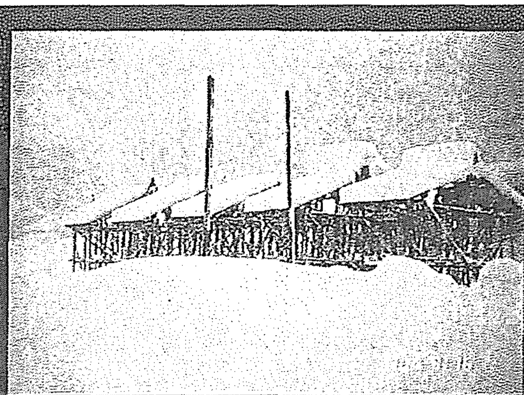
水没した木籠（こごも）集落（2005.5）
Kogomo in Yamakoshi, the area sunk due to the earthquake (May 2005)



集落ごとの被災状況（家屋全壊率約44%）
Extent of damage to houses observed in each area
(Overall, 44% of the total houses were completely destroyed.)



旧上平村・克雪タウン計画（1988年）
"Housing Project for a Heavily Snowy Area" developed by former Kamitaira Village (now Nanto City) in Toyama Pref. in 1988



旧上平村・克雪タウン計画（1988年）
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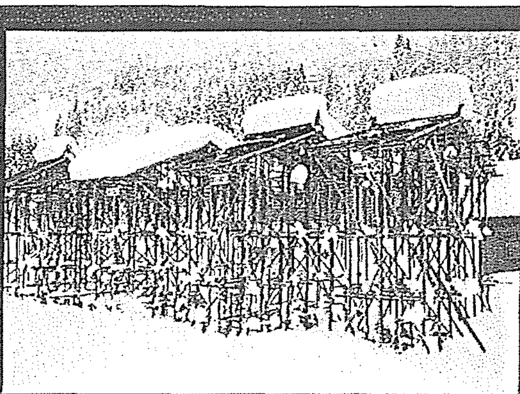

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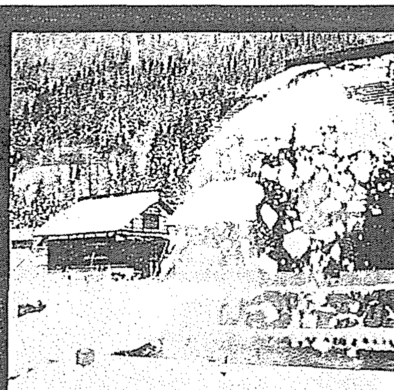


旧上平村・克雪タウン計画（1988年）
Housing Project for a Heavily Snowy Area developed by former Kamitaira Village (now Nanto City) in Toyama Pref. in 1988

長岡市中山間地型復興住宅検討委員会
Committee on rebuilding houses in quake-hit hilly and mountainous areas of Nagaoka City

期間：2005年5月～12月
目的：できるだけ多くの被災者が自立で住宅再建ができるように、

- 雪に強い住宅
- 中山間地の暮らしに配慮された住宅
- 約1千万円で建てられる住宅

を開発

Project period: May–Dec. 2005
Objective: to assist as many affected people as possible in rebuilding their houses at their own expense

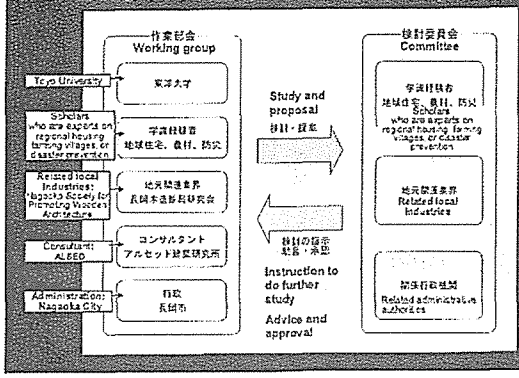
to develop houses
- that are strong enough to withstand heavy snow-loads
- with consideration for lives in the hilly and mountainous areas
- that can be built for about 10 million yen

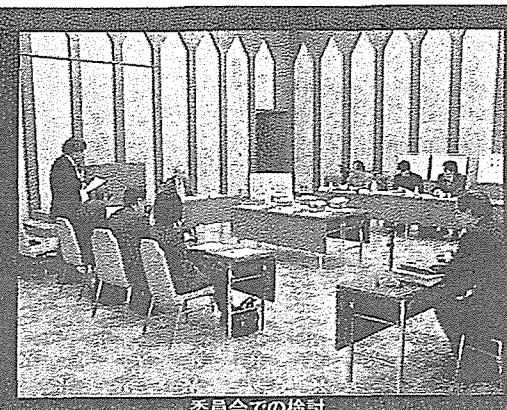
検討委員会のメンバー
Committee members

委員長　：内田雄三　（東洋大学）
副委員長：三井所清典（芝浦工業大学）
委員　　：岩田司　　（建築研究所）
　　　　：秋山哲一　（東洋大学）
　　　　：平井邦彦　（長岡造形大学）
　　　　：西村伸也　（新潟大学）
　　　　：深澤大輔　（新潟工科大学）
　　　　：志田普弘　（長岡木造振興研究会）
コンサルタント：アルセッド建築研究所

Chairman: Yuzo Uchida (Toyo University)
Vice chairman: Kiyonori Misho (Shibaura Institute of Technology)
Members: Tsukasa Iwata (Building Research Institute)
Tetsukazu Akiyama (Toyo University)
Kunihiko Hirai (Nagaoka Institute of Design)
Shinya Nishimura (Niigata University)
Daisuke Fukazawa (Niigata Institute of Technology)
Yoshihiro Shida (Nagaoka Society for Promoting Wooden Architecture)
Consultant: Architectural Laboratory for Systems Environment & Development (ALSED)

検討委員会の体制
Framework of the committee





委員会での検討
Discussion among committee members

山古志大工とのワークショップ
Workshop with carpenters working in Yamakoshi

中山間地型復興住宅の５つの基本方針
Five basic principles for the development of houses to be rebuilt in the quake-hit hilly and mountainous areas

1．山古志らしい住まい
2．雪と上手に付き合う住まい
3．地域循環型の住まい
4．コスト負担を軽減する住まい
5．安全で快適に長く住み続けられる住まい

1. Houses that reflect the characteristics of Yamakoshi
2. Houses that can handle heavy snow loads
3. Houses that contribute to the local community
4. Houses that can be built at low costs
5. Houses where people can live safely and comfortably for a long time

1．山古志らしい住まい

Houses that reflect the characteristics of Yamakoshi

◎山古志の美しい風景にしっくりなじむ住まい

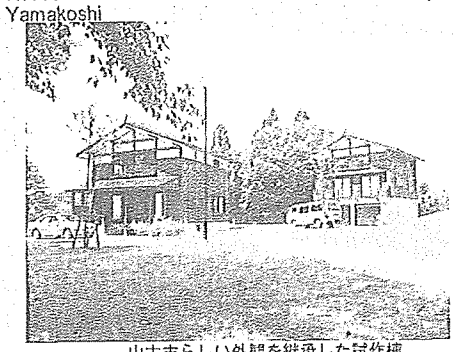
Houses that blend well with the beautiful landscape of Yamakoshi

美しい中門造りの民家（下見板・妻面の木組・深い軒）

Beautiful *Minka* (folk dwellings) of *Chumon-zukuri* (with a wing projecting from the main house) with wood siding boards, wooden framework on gable ends, and wide eaves

●山古志の美しい風景にしっくりなじむ住まい
Houses that blend well with the beautiful landscape of Yamakoshi

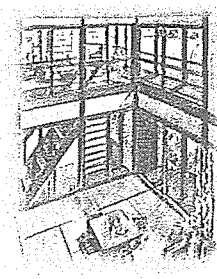
●山古志の美しい風景にしっくりなじむ住まい
Houses that blend well with the beautiful landscape of Yamakoshi



山古志らしい外観を継承した試作棟
Trial models that retain distinctive characteristics of the exterior of the typical folk dwellings in Yamakoshi

●山古志の気候風土に対応した住まい
Houses that cope with the climate of Yamakoshi

寒く長い冬：明るく過せる暖かい住まい
Long, cold winters --> a warm house lit brightly with natural light coming in



□生活の中心となる茶の間は陽当たりの良い南側とします

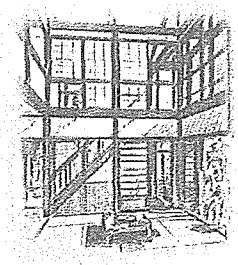
□茶の間上部を吹抜けとし、2階の窓から採光を確保します（十分な断熱・気密による暖かい吹抜け）

□2階の窓を掃出し窓としてより多くの光を採り入れます

□2階に日向ぼっこができるような「冬の茶の間」を設けます

●山古志の気候風土に対応した住まい
Houses that cope with the climate of Yamakoshi

蒸し暑い夏：涼しく過せる風通しの良い住まい
Hot and humid summers --> a house with good natural ventilation that keeps the living space cool

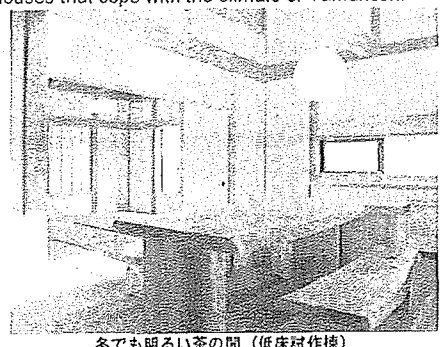


□夏の風が通り抜ける開放的な間取りや窓の配置とします

□引き戸を活用して風通しを良くします

□深い軒・庇により夏の陽射しを防ぎます

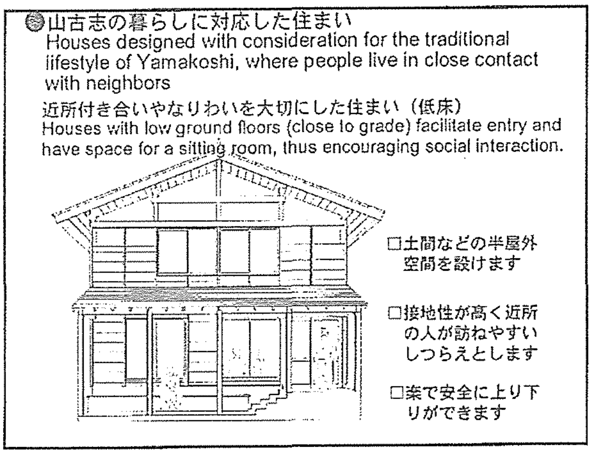
●山古志の気候風土に対応した住まい
Houses that cope with the climate of Yamakoshi



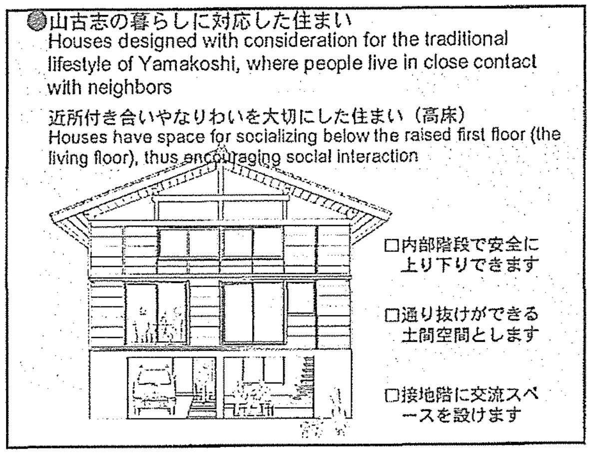
冬でも明るい茶の間（低床試作棟）
Living room that is bright and sunny even in winter (a trial model house with low ground floors)

●山古志の気候風土に対応した住まい
Houses that cope with the climate of Yamakoshi

光を採り入れる吹抜（ストーブ一台で家じゅう温か）
Open ceiling helps let abundant natural light come in.
(Residents can keep the whole house warm with only one heater.)

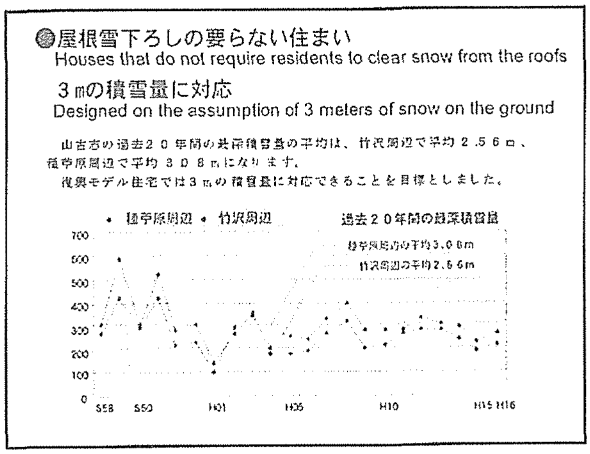


●山古志の暮らしに対応した住まい
Houses designed with consideration for the traditional lifestyle of Yamakoshi, where people live in close contact with neighbors
近所付き合いやなりわいを大切にした住まい（低床）
Houses with low ground floors (close to grade) facilitate entry and have space for a sitting room, thus encouraging social interaction.
□土間などの半屋外空間を設けます
□接地性が高く近所の人が訪ねやすいしつらえとします
□楽で安全に上り下りができます

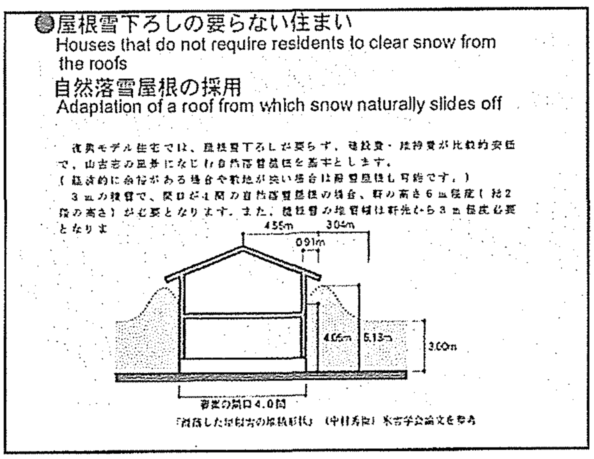


●山古志の暮らしに対応した住まい
Houses designed with consideration for the traditional lifestyle of Yamakoshi, where people live in close contact with neighbors
近所付き合いやなりわいを大切にした住まい（高床）
Houses have space for socializing below the raised first floor (the living floor), thus encouraging social interaction
□内部階段で安全に上り下りできます
□通り抜けができる土間空間とします
□接地階に交流スペースを設けます

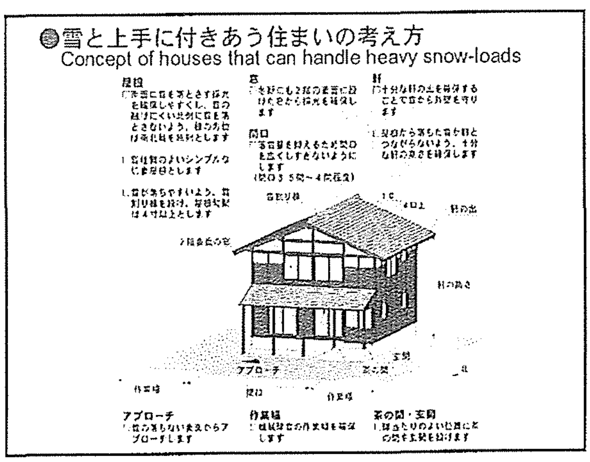
2．雪と上手に付きあう住まい
Houses that can handle heavy snow-loads



●屋根雪下ろしの要らない住まい
Houses that do not require residents to clear snow from the roofs
3ｍの積雪量に対応
Designed on the assumption of 3 meters of snow on the ground
山古志の過去２０年間の最深積雪量の平均は、竹沢周辺で平均２.５６ｍ、
種苧原周辺で平均３０８ｍになります。
復興モデル住宅では３ｍの積雪量に対応できることを目標としました。
種苧原周辺
竹沢周辺
過去２０年間の最深積雪量
種苧原周辺の平均3.08m
竹沢周辺の平均2.56m
700
600
500
400
300
200
100
0
S58
S60
H01
H05
H10
H15
H16



●屋根雪下ろしの要らない住まい
Houses that do not require residents to clear snow from the roofs
自然落雪屋根の採用
Adaptation of a roof from which snow naturally slides off
4.55m
3.04m
0.91m
3.00m



●雪と上手に付きあう住まいの考え方
Concept of houses that can handle heavy snow-loads

3．地域循環型の住まい
Houses that contribute to the local community

●県産材、自然素材を最大限活用した住まい
Houses constructed with wood and other natural materials from Niigata Prefecture

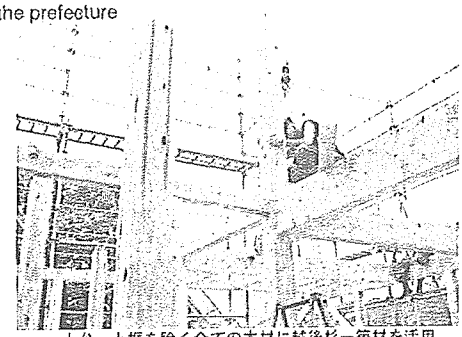
環境負荷の軽減、地元産業の活性化という観点から、復興モデル住宅では、土台を除く構造材、造作材の全てに県産杉を使用します。

●地元の大工技術を活用した住まい
Houses constructed utilizing techniques of local carpenters

住まいの維持管理、地元経済の活性化、大工技術の継承という観点から、山古志の住まいは山古志の大工さんに建ててもらうのが一番です。
復興モデル住宅の検討にあたっては、山古志の大工さん達と、どのような住宅が山古志にふさわしいか話し合ってきました。

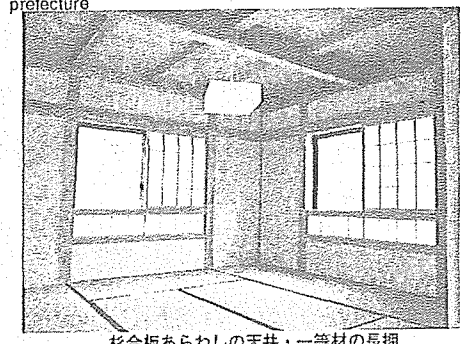
大工さんとの検討会の様子

●県産材、自然素材を最大限活用した住まい
Houses that use wood and other natural materials from the prefecture



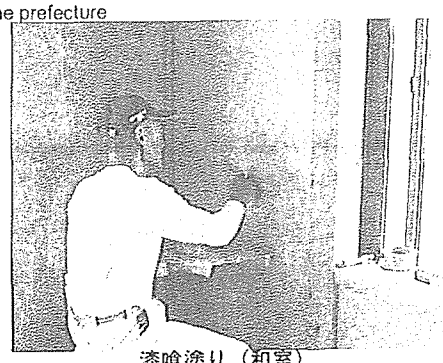
土台・上框を除く全ての木材に越後杉一等材を活用
Utilization of grade-one Echigo (Niigata Pref.) cedar for all members except for ground sills and head rails

●県産材、自然素材を最大限活用した住まい
Houses that use wood and other natural materials from the prefecture



杉合板あらわしの天井・一等材の長押
- Ceiling of visible cedar plywood
- Lintels for doors and windows made of grade-one Echigo cedar

●県産材、自然素材を最大限活用した住まい
Houses that use wood and other natural materials from the prefecture



漆喰塗り（和室）
Plastering (for Japanese-style rooms)

4．コスト負担を軽減する住まい
Houses that can be built at low costs

●コストダウンの工夫　Cost reduction efforts

構法・材料・設備を共通化し、まとめてつくることのメリットを活かし、コストを抑えます。また、数棟まとめて同時に建設したり、規格品を共同購入するための体制づくりを検討しています。

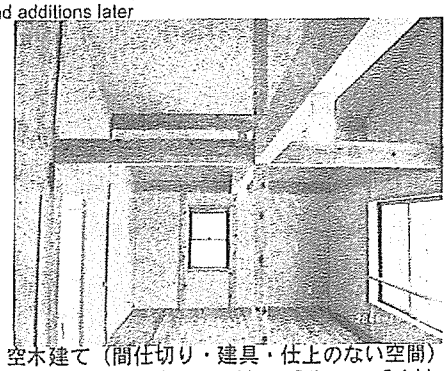
●地域の住宅生産者・建材メーカー・行政による建設支援
Construction support by local housing manufacturers, housing material manufacturers, and Administration

地域の住宅生産者の協力、建材メーカーによる復興協賛価格での材料供給、様々な行政支援の活用により、コスト負担の軽減を検討しています。

●成長する住まいの考え方
Concept of starting with the basics and making completions and additions later: Residents first settle into houses with minimum interior finishing and make completions and additions to the houses as they are able to.

山古志では、屋根、外壁、必要最低限の内装ができた段階で住み始め、あとは住みながら徐々に手を入れていくことを基本建て（からさだて）といいます。復興モデル住宅でも、はじめは最小限の設備・仕上で安く住宅を手に入れ、住みながら住まいを成長させていける仕組みを推奨しています。

●成長する住まいの考え方
Concept of starting with the basics and making completions and additions later



空木建て（間仕切り・建具・仕上のない空間）
Basic structure (without partitions, fittings, or finishing)

●行政による建設支援
Construction support by the Administration

1・県産材の活用
2・屋根雪対策
3・バリアフリー対策
4・景観対策

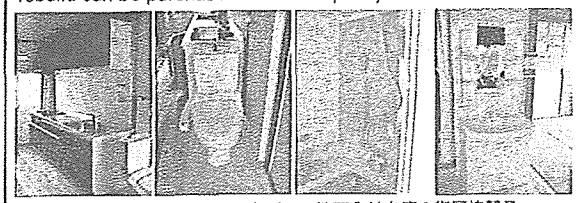
４要件を満たせば
１８０万円の補助

Houses that meet the following four requirements can receive a 1.8-million-yen grant.

1. Use of local wood from the prefecture
2. Measures against snow accumulation on the roof
3. Barrier-free design
4. Consideration for the landscape

復興基金による中山間地型復興住宅支援の立ち上げ
Launch of a system to support the rebuilding of houses in quake-hit hilly and mountainous areas, with restoration funds

●建材メーカーによる建設支援（協賛価格での仕入）
Construction support by housing manufacturers (products to rebuild can be purchased at a lower price)



キッチン・トイレ・ユニットバス・洗面化粧台等の復興協賛品。
その他にサッシ・屋根材・塗料等も復興協賛を頂いています。

Items for which assistance is given to help restoration, such as kitchen units, toilets, prefabricated baths, and bathroom vanity units

Other items that can be purchased at lower prices include sashes, roofing materials, and paint.

5．安全で快適に長く住み続けられる住まい

Houses where people can live safely and comfortably for a long time

●十分な断熱・気密性による快適で省エネの住まい
Comfortable and energy-efficient houses with sufficient thermal insulation and airtightness

断熱性・気密性を十分に確保することで、冬暖かく夏涼しい、省エネルギーで快適な暮らしを実現します。窓は複層ガラスにより結露も防止します。

●地震・台風・積雪に強い住まい
Houses that can withstand earthquakes, typhoons, and heavy snow-loads

バランスの良い耐力壁の配置、木材の接合部の緊結、床や屋根面の剛性確保等により、開放的な間取りでありながら、高い構造安全性能を確保します。

●長持ちし、維持管理しやすい住まい
Houses that last long and are easy to maintain

乾燥木材の使用、外壁・屋根面の通気、ベタ基礎による床下の防湿、基礎高さの確保により木材の腐朽・蟻害を防ぎ、建物の長寿命化を図ります。

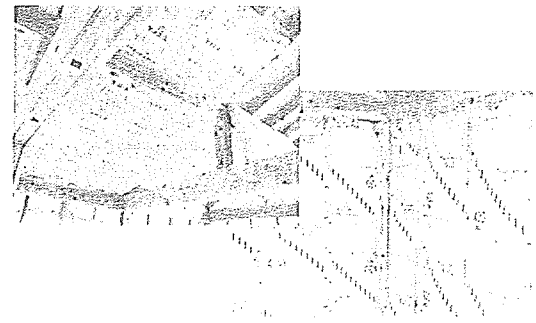
●誰にもやさしいバリアフリーの住まい
Barrier-free houses so that everyone, including the elderly people, can live comfortably

室内には段差をなくし、必要な箇所に手摺を設置、日常使う階段はゆとりのある勾配とする等、基本的なバリアフリー性能を確保します。

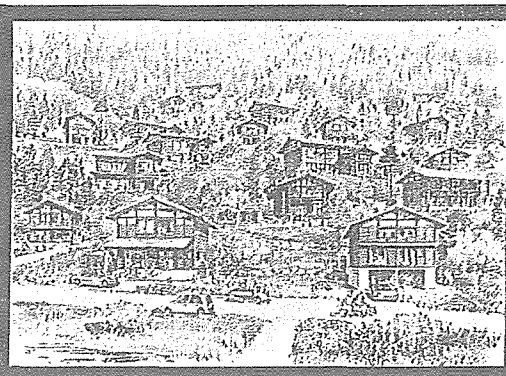
●十分な断熱・気密性による快適で省エネの住まい
Comfortable and energy-efficient houses with sufficient thermal insulation and airtightness

十分な断熱（樹脂＋アルミの断熱サッシ）
Sufficient thermal insulation
(insulation sash made of resin and aluminum)

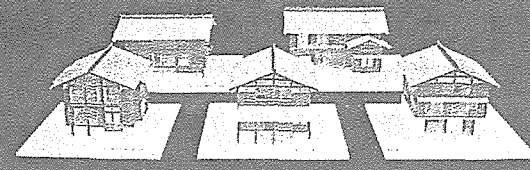
●十分な断熱・気密性による快適で省エネの住まい
Comfortable and energy-efficient houses with sufficient thermal insulation and airtightness



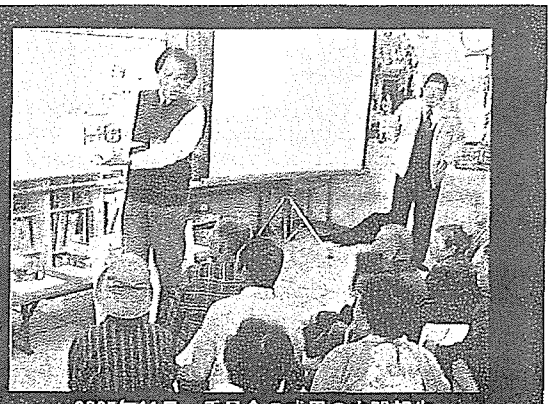
十分な断熱 Sufficient thermal insulation



2005年10月　山古志らしい住まいづくりの提案
Proposal of rebuilding houses that preserve the characteristics of Yamakoshi (Oct. 2005)

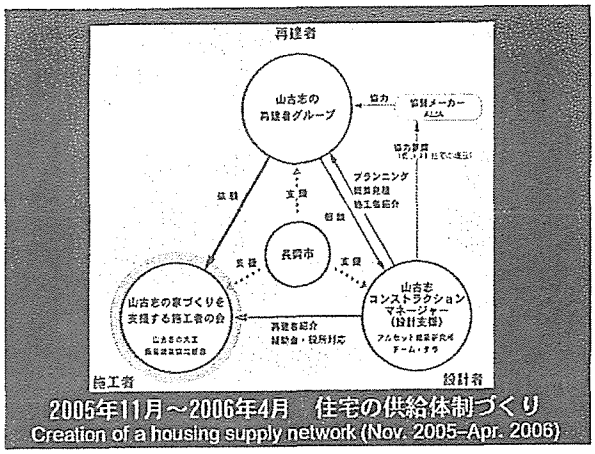


2005年10月　自立再建モデル住宅の提案
Proposal of model houses that the affected people can build at their own expense (Oct. 2005)



2005年11月　委員会の成果の中間報告
Interim report from the committee on its achievements (Nov. 2005)

2005年11月　委員会の成果の中間報告
Interim report from the committee on its achievements (Nov. 2005)



2005年11月～2006年4月　住宅の供給体制づくり
Creation of a housing supply network (Nov. 2005–Apr. 2006)


2005年11月～2006年4月　山古志の大工への報告と協力依頼
Report to carpenters in Yamakoshi and request for their cooperation (Nov. 2005–Apr. 2006)


2005年11月～2006年4月　長岡建築協同組合の協力体制づくり
Establishment of a system of cooperation within the Nagaoka Architectural Cooperative (Nov. 2005–Apr. 2006)


2005年11月～2006年4月　長岡の設計者の協力体制づくり
Establishment of a system of cooperation among designers in Nagaoka City (Nov. 2005–Apr. 2006)


2005年11月～2006年4月　建材メーカーへの復興協賛の協力依頼
Request to housing material manufacturers for cooperation by assisting with the restoration project (Nov. 2005–Apr. 2006)


2006年7月～11月　自立再建モデル（試作棟）の建設
Construction of model houses that the affected people can rebuild at their own expense (trial models)

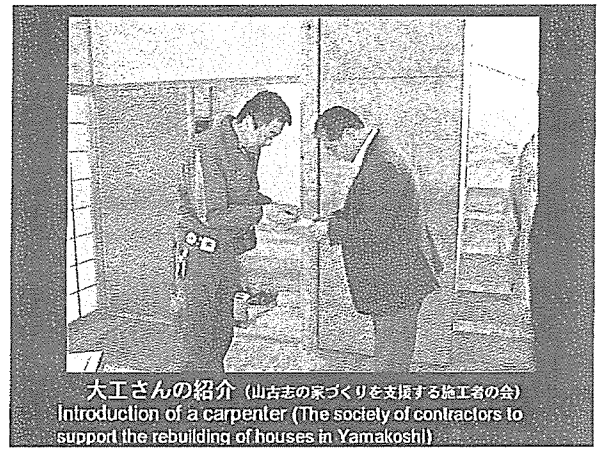
2006年10月～11月　モデル住宅の見学会
Visit to the model houses (Oct.–Nov. 2006)

2006年10月～11月　モデル住宅の見学会
Visit to the model houses (Oct.–Nov. 2006)

2006年10月～11月　モデル住宅の見学会
Visit to the model houses (Oct.–Nov. 2006)

設計相談（モデル住宅にて）
Design consultation (held in the model house)

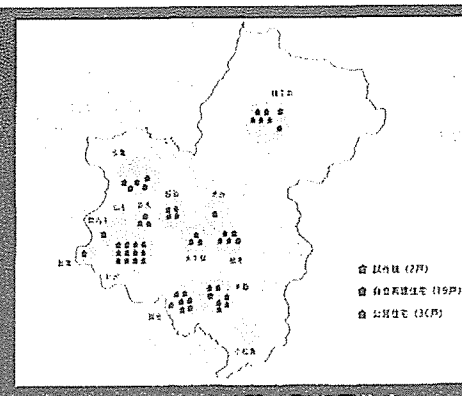
設計相談（東京での打合せ）
Design consultation (held in Tokyo)



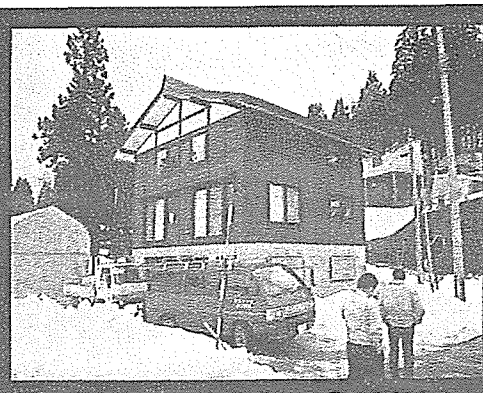
大工さんの紹介（山古志の家づくりを支援する施工者の会）
Introduction of a carpenter (The society of contractors to support the rebuilding of houses in Yamakoshi)

中山間地型復興住宅での自立再建

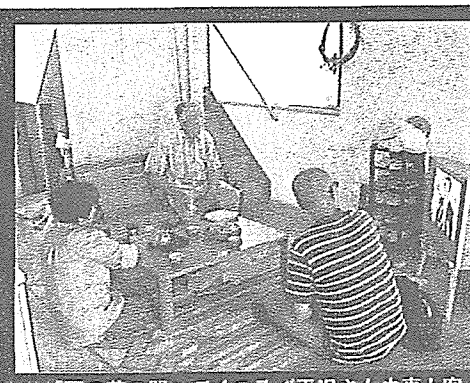
Rebuilding houses in the quake-hit hilly and mountainous areas at individuals' expense



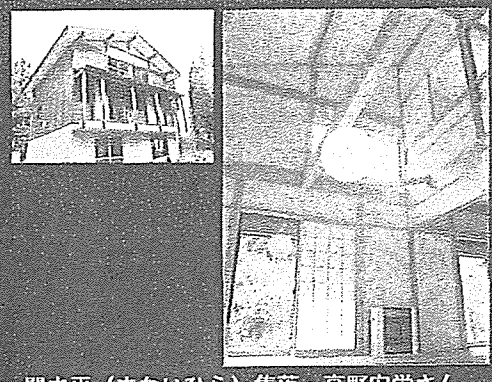
実現した中山間地型復興住宅
Houses rebuilt in the quake-hit hilly and mountainous areas



虫亀（むしがめ）集落・平澤武次郎さん
Home of Mr. Hirasawa, a resident of Mushigame Area, Yamakoshi



「夏の茶の間」でくつろぐ平沢さん夫妻と客人
Mr. and Mrs. Hirasawa and a visitor relaxing in their "summer living room"



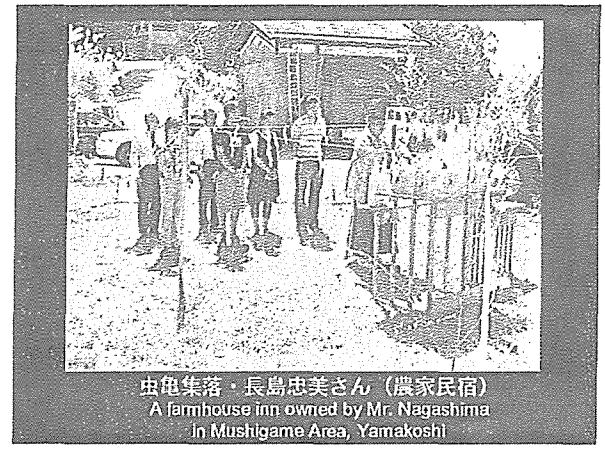
間内平（まないひら）集落・高野安栄さん
Home of Mr. Takano, a resident of Manaihira Area, Yamakoshi

油夫（ゆぶ）集落・小川政勝さん
Home of Mr. Ogawa in Yubu Area, Yamakoshi

梶金（かじがね）集落・関幸作さん
Home of Mr. Seki in Kajikane Area, Yamakoshi

池谷（いけたに）集落・青木行雄さん
Home of Mr. Aoki in Iketani Area, Yamakoshi

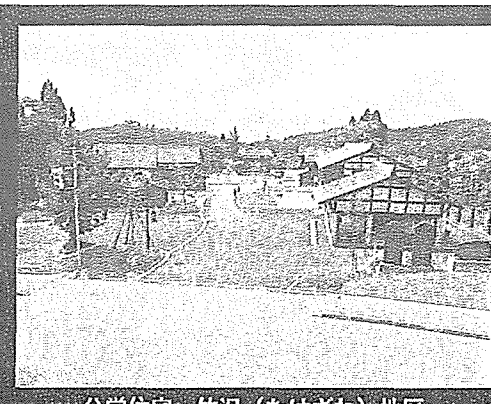
虫亀（むしがめ）集落・酒井米作さん
Home of Mr. Sakai in Mushigame Area, Yamakoshi



虫亀集落・長島忠美さん（農家民宿）
A farmhouse inn owned by Mr. Nagashima
in Mushigame Area, Yamakoshi

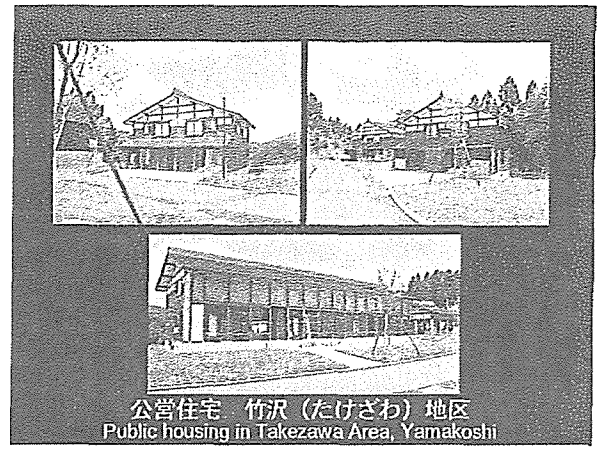
中山間地型復興住宅での公営住宅

Public housing built in the quake-hit hilly and mountainous areas



公営住宅　竹沢（たけざわ）地区
Public housing in Takezawa Area, Yamakoshi

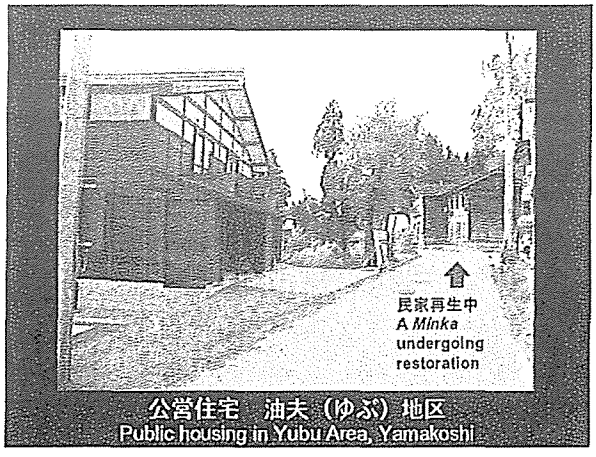
公営住宅　竹沢（たけざわ）地区
Public housing in Takezawa Area, Yamakoshi



公営住宅　竹沢（たけざわ）地区
Public housing in Takezawa Area, Yamakoshi

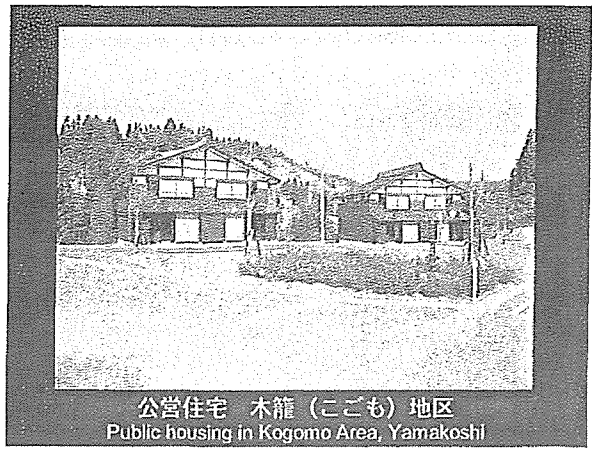
公営住宅　桂谷（かつらや）地区
Public housing in Katsuraya Area, Yamakoshi

公営住宅　種苧原（たねすはら）地区
Public housing in Tanesuhara Area, Yamakoshi



公営住宅　油夫（ゆぶ）地区
Public housing in Yubu Area, Yamakoshi

公営住宅　梶金（かじがね）地区
Public housing in Kajigane Area, Yamakoshi



公営住宅　木籠（こごも）地区
Public housing in Kogomo Area, Yamakoshi

公営住宅　楢木（ならのき）地区
Public housing in Naranoki Area, Yamakoshi

公営住宅　大久保（おおくぼ）地区
Public housing in Okubo Area, Yamakoshi

10. Opportunities and prospects wooden architecture in Korea

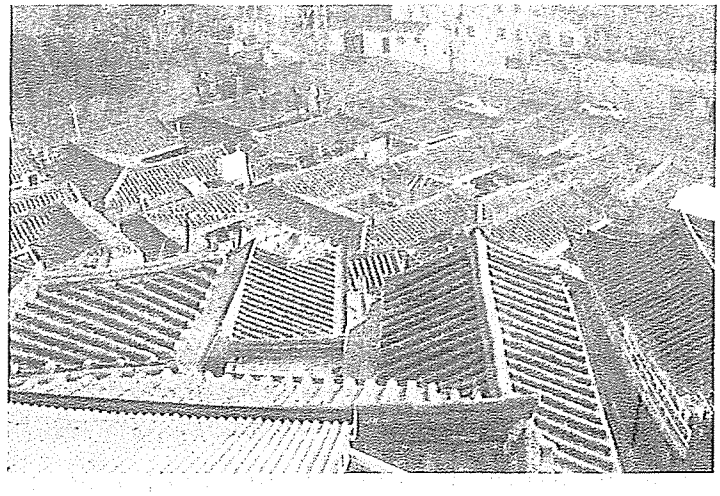
Mr. KANG, Byung-Ok

OPPORTUNITIES AND PROSPECTS WOODEN ARCHITECTURE IN KOREA

Kang, Byung Ok

1. The History and Background of Wooden Architecture

◦ The residential construction industry in Korea is large, high-rise building approximately 500,000~700,000 housing units per year for most of the last two decades. The Korean traditional housing structure is post and beam wooden house. But the most infrastructure, buildings and homes had been destroyed by Korean War in 1953. Only fifty years after the end of war, Korea now has a fully industrialized economy which the eleventh largest in the world. During the economy was moving, the vast majority of urban Korean architecture are designed by concrete construction and some of steel construction.



◦ Most of city dwellers in Korea are two or three generations removes from an agrarian lifestyle so, wage have risen and people have had more

disposable income from their real-estate, a trend began to develop during the late 1980's towards consumers wanting to live closer to the land. This movement has come to be as "country-style housing", it means owning a home with a garden in the suburbs, whether it be a single-family house or a low-rise condominium.

◦ However, by the late 1980's population was rapidly increasing as well as becoming urbanized, and "country-style housing" development industry was gradually increasing in raw urban land.

2. Wooden Architecture Components Wood Products

□ Korean Imports of Wood in 2006

◦ Approximately 65% of Korea' land mass is forested, totaling about 6.44 million hectares. But Korea's forest are producing just 1.2 million cubic meters of log in 1966, or just 13.6% of domestic demand, While domestic production of logs in Korea is low, as the economy has grown total consumption of logs has increased from 4.0 million cubic meters in 1970 to 8.7 million cubic meters in 1993.

◦ Therefore, Korea must rely on log imports as the raw material for its domestic wood processing industry, importing 6.8 million cubic meters of softwood logs and 1.4 million cubic meters of hardwood logs in 1996.

◦ The United States and Canada have traditionally been the principal suppliers of softwood logs to Korea. However, during the late 1980's and early 1990's rising log prices due to pubic harvest restrictions in the U.S. have provided other country, New Zealand and Russia, with an opportunity to increase their share of Korean log market.

◦ Even as Korean log imports declined by 25.8% in value since 1993, finished wood product imports have increased dramatically. Most of this rise can be attributed to increased imports of tropical hardwood species in the form of boards, veneers, finished panel products, doors and windows.

◦ This trend to value-added wood products continues to this day, and the volume of rough logs and lumber imports is shown in the below.

- Rough Wood : Approx. 750 million dollars(US)
- Lumber : Approx. 250 million dollars(US)
-

□ Statistics of Wooden Building Construction

◦ 2006 : Approx. 6,000 unit
◦ 2007: Estimated number, Approx. 10,000 unit

□ General Wooden Construction Type in Korea

◦ Traditional Wooden Architecture : Renovation for original building or new construction as traditional design
◦ Light Frame Wood House(2×4 system) : Most of new residence

◦ Non-residence (Mixed-use and Commercial, etc.) : Post and beam structure and Hybrid system with engineered wood for gymnasium in school, golf club house, education center, church, etc.

◦ Outdoor Architecture : Wooden deck, pagoda, small bridge, etc.

□ Building Type of Residence in Korea

Residence 2000

◦ More than 90 % of residence are concrete apartment

- 10~15 story Apartment : 70%
- 5~10 story Apartment : 25%
- 2 story Single Home : 5%

Residence 2020

◦ Increase up to more than 20% from present 5% for single homes and 3~4 story multi-family house by the wooden architecture.

- 20~45 story High-rise Apartment : 50%
- 3~10 story Low-rise Apartment, Villa : 30%
- 2 story Single Home, Town House : 20%

3. The Regulatory Framework for Wood Building

□ The fire resistance performance standard of light wood frame building as contained in the (Korea Standard) KS F 1611-1 and KS F 1611-3.

□ Building height made of wood construction shall be limited to 18meters and building height excluding roof shall be limited to 15meters.

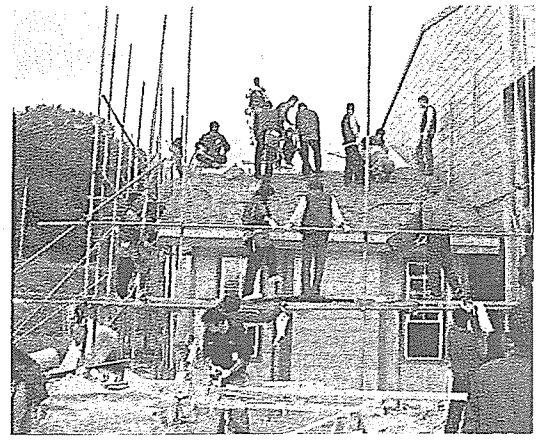
□ The gloss floor are of wood construction shall be limited to 3,000 ㎡, and fire-partitions shall be provided every 1,000 ㎡. Only if sprinklers are installed for fire-protection, the gross floor area shall be allowed to 6,000 ㎡ . The light-frame construction shall be limited to 3 story, while with sprinkler it is allowed to 4 story.

□ The government will continue the endeavors to make builders build low density and multi-family row housing in new development

4. Existing Situation of the skilled labor and building trades

□ Since most post-War construction in Korea has been in either reinforced concrete or steel, the traditional carpentry profession there has virtually died out. At present, wood design skills in both light wood frame and heavy timber construction is not included in any of architectural and engineering curricula in school. Therefore, there is a shortage of carpenters and skilled tradesman who are conversant with both light wood frame and heavy timber construction,

□ But wood training and certification programs are being carried out Wood Building Design Center(WBDC) at Kookmin University since 1997. The WBDC had graduated more than 2,950 students by the end of 2006. The WBDC offers a full range of learning opportunities in both full and part-time students through several different courses.



□ The Korea Wood Building Association(KWBDA) is undertaking a number of pilot programs to built labor infrastructure in the industry and skills in both light wood frame and heavy timber construction.
Among these are :

• Training by KWBDA for those seeking to apply for site supervisor / inspector qualifications for future local regional officers who would become accountable and responsible for on-site inspections.

• The KWBDA has been carried a Wood Design Technical Qulification Examination since 2004.

5. Prospect and Propose of Wooden Architecture in Future

□ Demographic and Social-Economic Market-Forces ;

• trend towards suburban, "country-style" housing
• institution of the 5-day workweek leading to more leisure time
• growing concern for a healthy environment and better housing
• gradual development of Korean wood construction industry
•

□ Government Policies Driving the Wood Construction Industry

• projecting 10 million new market housing units by 2020
• projecting 1 million new welfare housing units by 2012

• elevating the overall housing supply ratio to 116% by 2020
• new environmental legislation to improve the quality of urban life.

□ It is very important to advertise the advantages of the wooden architecture, to provide updated information and technology, and to train experts, designers and workers.

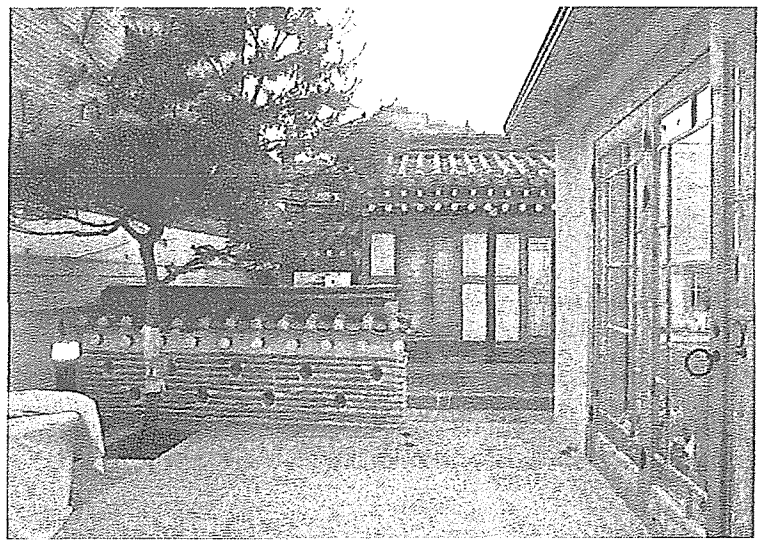
□ Therefore, Asia Forum for Wooden Architecture(AFWA) aims to establish a cooperative framework for exchanging technical information and promoting better design wooden building between Asian country in future.

[Current Use of Wood Products/Components in Korea Buildings]

■ Korea traditional wooden building (from 1990 to 2006)

Most of building is renovation of old traditional original Korean wooden house or a few of new building

□ **Low-rise Residential**

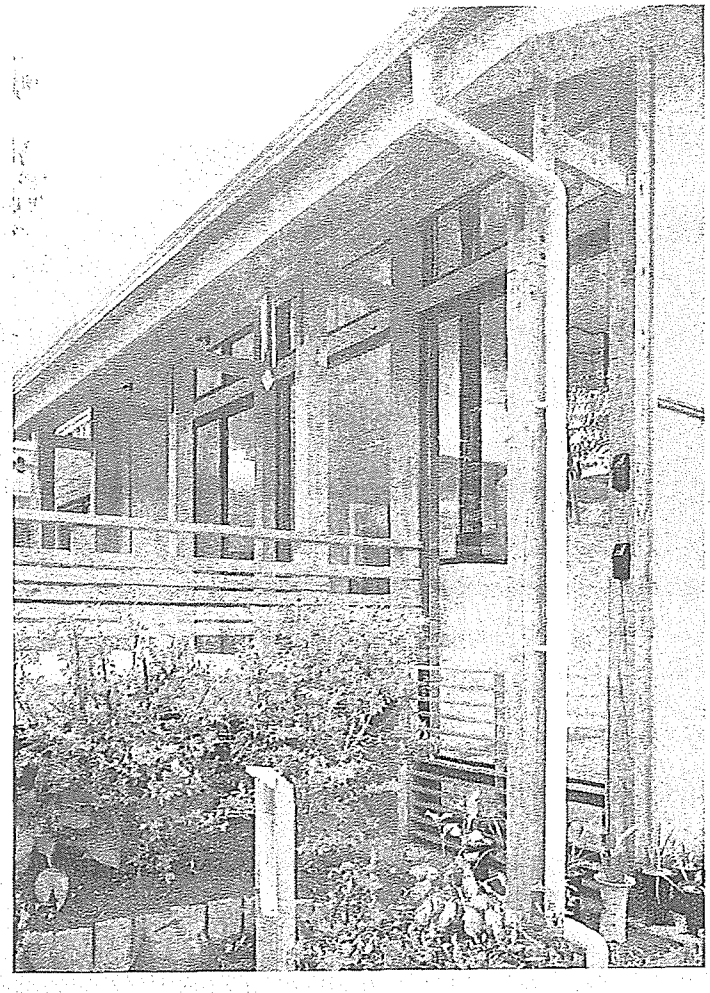


Renovation of old traditional House with
Light-Frame Wood System

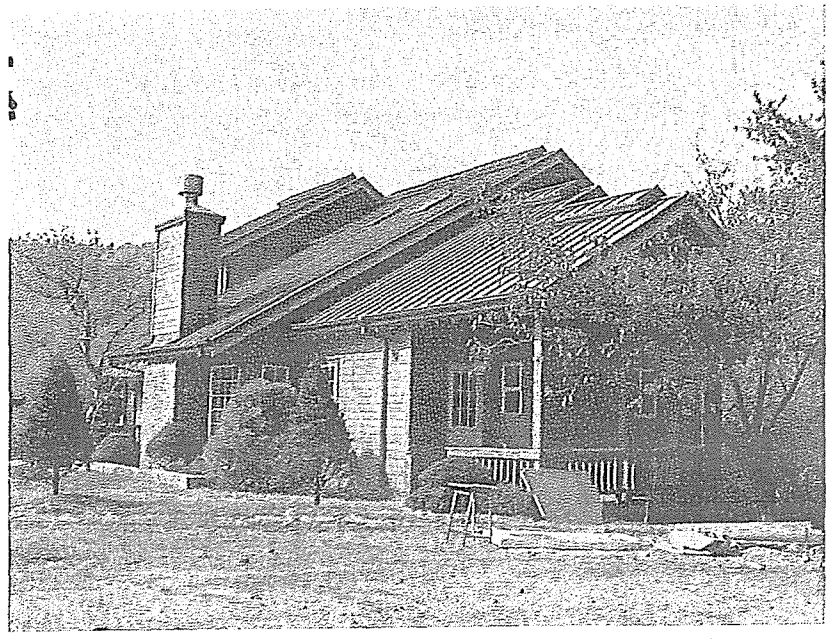
■ Modern wooden building (from 1990 to 2006)

The Residential building is built by light wood frame(2×4 system) and mixed-use and commercial building is built by hybrid structure combined with steel and concrete, and heavy timber or engineered wood.

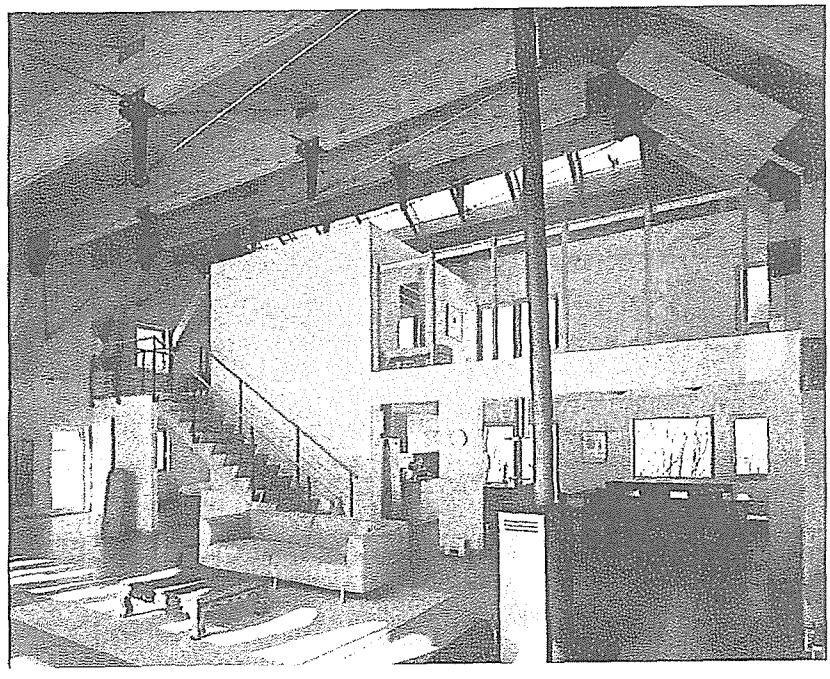
□ Low-rise Residential



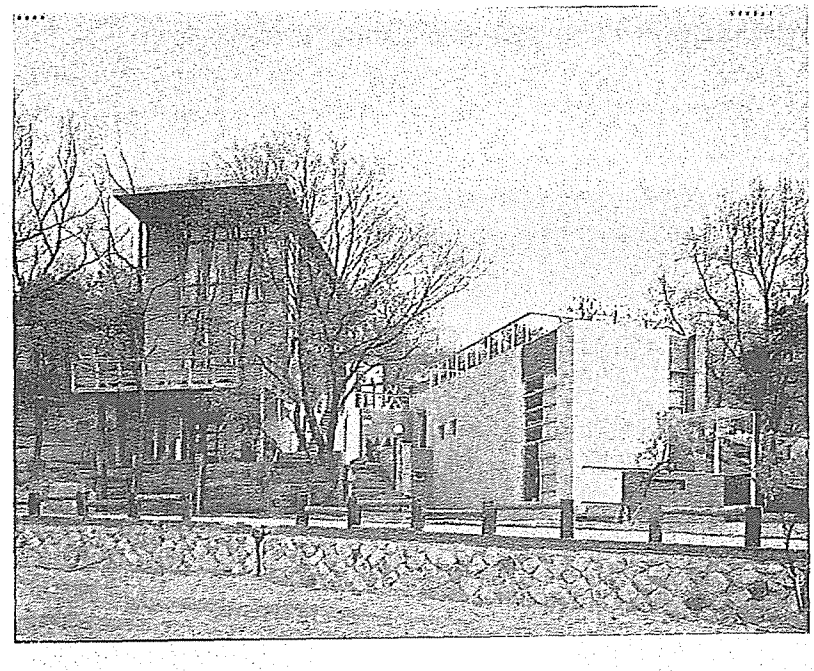
Shinwon-dong, Kyunggido
Light-Frame, Post and Beam Structure House



Dongwon-dong, Kyunggido
Light-Frame Wood Structure House



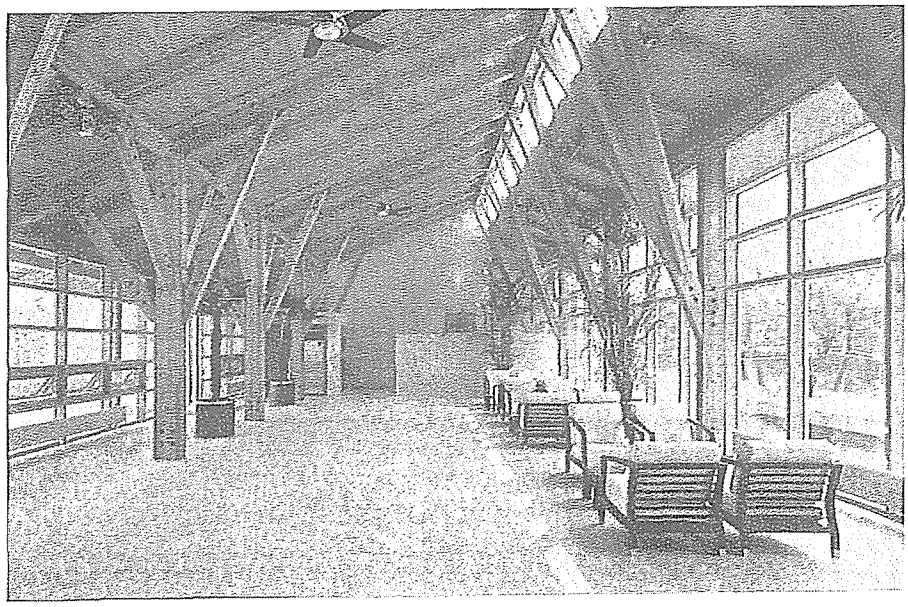
Jindong-ri, Gangwondo
Post and Beam(Glulam) Structure House



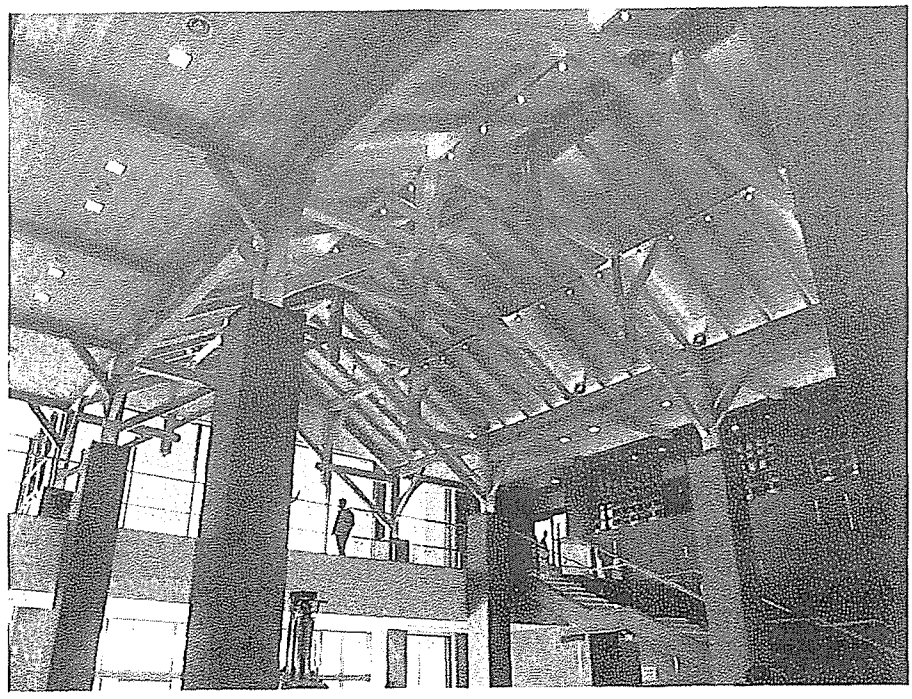
Minmaru, Ilsan City
Light-Frame Wood on Concrete Structure House

Bundag City, Kyunggido
Light-Frame Wood Structure House

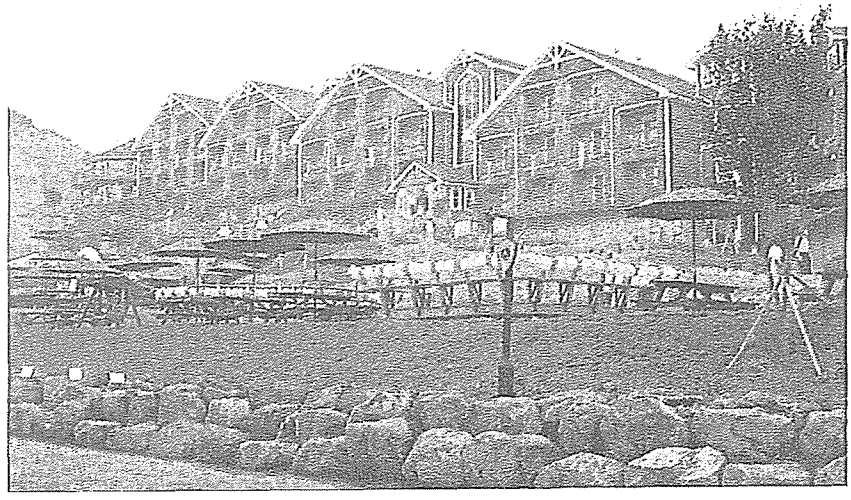
□ Non-residential (Mixed-use and Commercial, etc.)



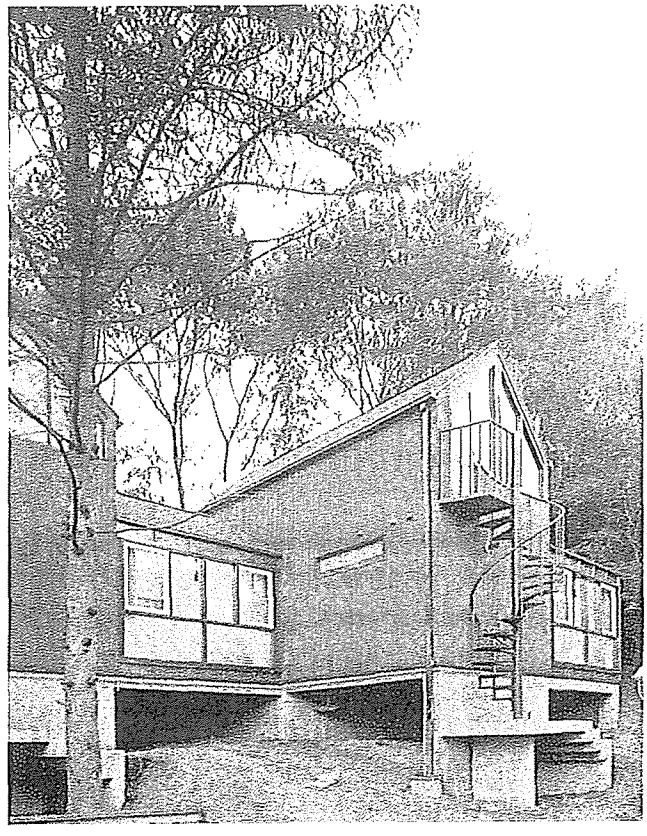
Guest House, Onyang City
(President's 2000 Award for Korea Architectural Culture)



Chuncheon Golf and Country Club, Gangwondo
Post and Beam Timber Structure



Gumgandsan Resorts
Light-Frame, Engineered Wood Structure House



Bongpyung Pension, Gangwondo

Light-Frame Wood Structure House

*** Thank You ***

OPPORTUNITIES AND PROSPECTS WOODEN ARCHITECTURE IN KOREA

Mita Kyoyo Kaigisho,
Tokyo

2007. 11. 27

KWBDA

CONTENTS

1. HISTORY and BACKGROUND of WOODEN ARCHITECTURE
2. STATE of WOODEN ARCHITECTURE
3. MEET with STUDIES and SPREAD for WOOD BUILDING
4. PRESENT SITUATION of EDUCATION PROGRAM for THE SKILLED LABOR and BUILDING TRADES

1. HISTORY AND BACKGROUND OF WOODEN ARCHITECTURE

- DEVELOPMENT OF KOREA TRADITIONAL HOUSING
  - During the economy was moving, the vast majority of urban Korean Architecture are designed by concrete construction. Therefore, Wooden Building include traditional wooden house construction has been reduced.
- PEOPLE'S LIFE STYLE TOWARD WELL-BEING and SUSTAINABLE HOUSE
  - By the late 1980's population was rapidly increasing as well as becoming urbanized "country-style housing", "pension home", "resort facilities", and "remodeling of existing building".

2. STATE OF WOODEN ARCHITECTURE [1]

STATISTICS OF WOODEN BUILDING CONSTRUCTION

- 2006 YEAR BUILDING PERMIT
  - approx. 720,000㎡
  - approx. 6,000 unit (Average size 120㎡/Unit)
- 2007 YEAR ESTIMATION
  - approx. increasing up to 10,000 unit

STATISTICS OF WOODEN PRODUCTS IMPORTS [2006]

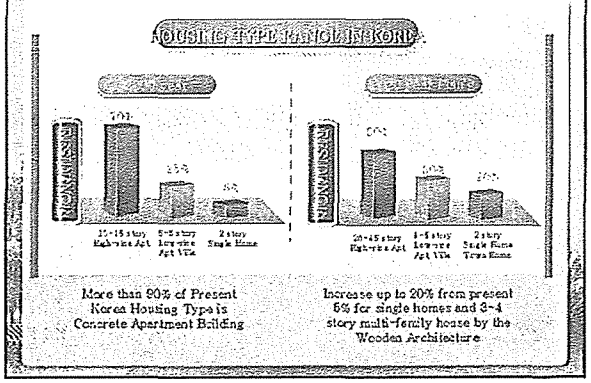
- KOREA : more than 90% of 2.6 million ㎥ log rely on importing
- Most of wood products(Rough Wood) import from New Zealand and South-east Asia. The finished wood products import have increased from the United States and Canada.
  - ROUGH WOOD : approx. 750 million US dollars
  - LUMBER : approx. 250 million US dollars

2. STATE OF WOODEN ARCHITECTURE (2)

Four Different Type of Wood Building in Korea

- Traditional House : The wooden post and beam structure which has been conserved and maintained as original design and structure, but now small number of house remained in a group
- Light Frame Wood House(Log home) : Most of construction is 2X4 system
- Non-residence (Mixed-use and Commercial) : Post and Beam structure and Hybrid system with steel and concrete structure
- Outdoor Architecture : Wooden Deck, Small Bridge, Space Frame, Bench and Play Ground Equipment, etc.

2. STATE OF WOODEN ARCHITECTURE (3)



More than 90% of Present Korea Housing Type is Concrete Apartment Building

Increase up to 20% from present 5% for single homes and 3~4 story multi-family house by the Wooden Architecture

3. MEET with STUDIES and SPREAD for WOOD BUILDING [1]

- The Korean regulatory frame work for the Fire and Structural Safety had been relieved and revised to allow for the multi-family residential and non-residential building for Wood Structure in 2005.
  - The fire resistance performance standard of light wood frame building as contained in the KS (Korea Standard) F 1611-1 and KS F 1611-3
  - Building height made of Wood construction shall be limited to 18 meters and allowed up to 4 story height with sprinkler.

3. MEET with STUDIES and SPREAD for WOOD BUILDING [2]

- Korea Architecture & Urban Research Institute are studying and researching the above subject in order to conserve, maintain and develop the traditional building, also will establish [Promotion Law for The Industry of Korea Traditional Building] in 2008.
  - Construction cost of Traditional Wooden House is between 8 million to 10 million Korea Won per 3.3 sq. meter(1pyung)
    (Approx. 2,700 ~ 3,600 USD per sq. meter is still high)
  - Therefore, Continuous Study and Development require for Detail Design, Construction System, Standard Material and Management Efficiency, etc.

4. SITUATION of THE SKILLED LABOR and BUILDING TRADES

- Training and Education Program
  - Wood Building Design Center at Kookmin University (since 1997)
  - One year diploma program
  - Three month studio program
  - Wood frame house builders program

→ Continuous Training Program

- KWBDA's Pilot Program to built labor Infrastructure
  - Wood Design Technical Qualifying Examination
  - Training for Site Supervision and Inspector

→ Concentrating on Education and Traning for skilled Tradesmen

5. PROSPECT and PROPOSE of WOODEN ARCHITECTURE in FUTURE

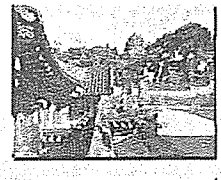
PROSPECT

- Trend towards suburban residence, "Country-style housing" and growing for a Healthy Environment and better Housing from Apartment residence
- Government Policies driving the Wood Construction Industry as new environmental legislation to develop the Korea traditional wood house and improve the quality of urban life

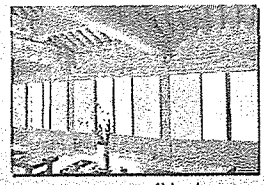
PROPOSE

- Asia Forum for Wooden Architecture (AFWA) aims to establish a cooperative framework for exchanging technical informations and promoting better design Wood Building between Asian Countries in Future

(Ref. 1) Korea Traditional Wooden House



Haksa-Jea Exterior



Haksa-Jea Exterior

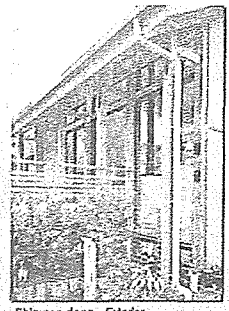
Haksa-Jea Interior

(Ref. 2) Korea Traditional Wooden House

Arumjigi Exterior

Arumjigi Interior

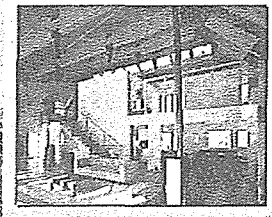
(Ref. 3) Low-rise Residential



Shinwon-dong – Exterior
Light-Frame, Post and Beam Structure House

Dongwon-dong – Exterior
Light-Frame Wood Structure House

(Ref. 4) Low-rise Residential



Jindong-ri – Interior
Light-Frame, Post and Beam Structure House

Minmaru – Exterior
Light-Frame Wood on Concrete Structure House

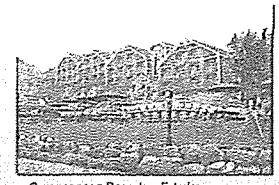
Bundang-city – Exterior
Light-Frame Wood Structure House

(Ref. 5) Non-residential (Mixed-use and Commercial)

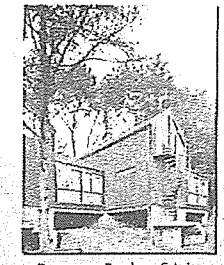
Guest House – Interior
Post and Beam Gulam Structure
President's Award for 2000 Korea Architectural Culture

Chucheon Golf and Country Club – Interior
Post and Beam Timber Structure

(Ref. 6) Non-residential (Mixed-use and Commercial)



Gumgangsan Resorts – Exterior
Light-Frame, Engineered Wood Structure



Bongpyung Pension – Exterior
Light-Frame Wood Structure House

Thank You !

THE MINISTRY OF CONSTRUCTION AND TRANSPORTATION
KOREA WOOD BUILDING DESIGN ASSOCIATION

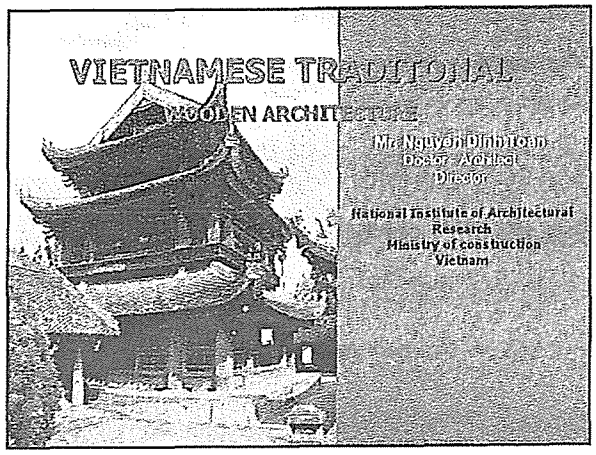
11. The Wooden structure inside Vietnamese architectural heritages

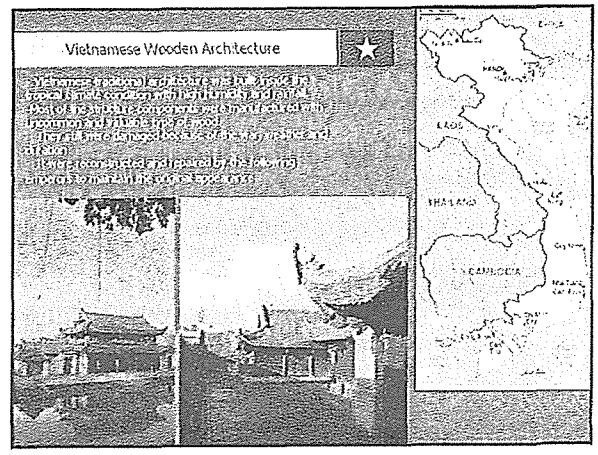
Mr. Nguyen dinh Toan

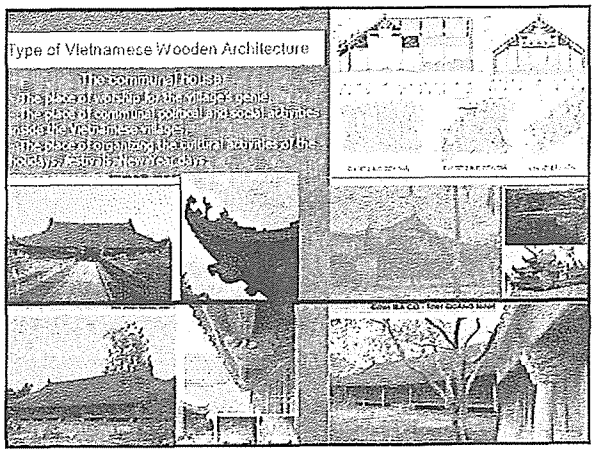
The Wooden structure inside Vietnamese architectural heritages
ベトナムの歴史的建造物としての木造建築

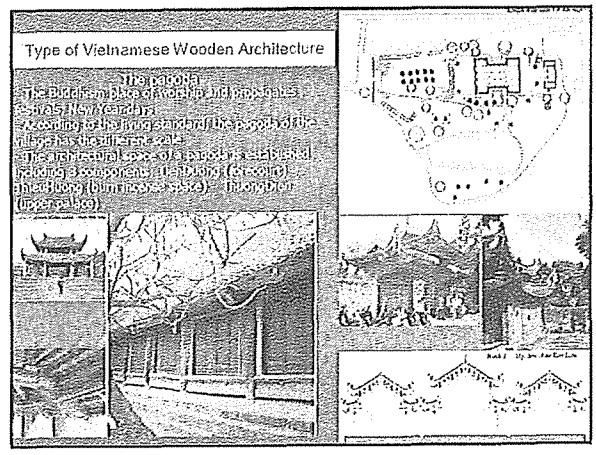
Looking through Vietnam area from the North to the South, inside the Vietnamese heritage, wooden structure is very special and diversified. Basing on the original structure, in order to adapt with different conditions (local culture, region, climate and geography), the wooden structure have been setuped with have many beautiful variants. It have improved the wooden heritage's structure become the identity of the local area, but they still preserve the basic form. By using the research data recently, most of typical types have been introduced with many details, sketches and picture to get the overall view of the wooden structure characteristic in Vietnam - Specific, Unity and Diversified.

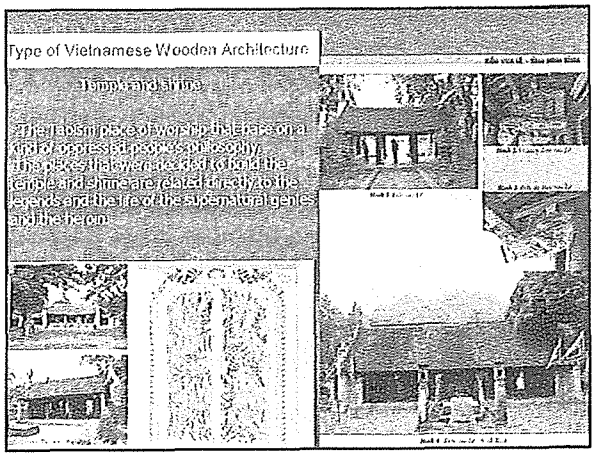
伝統木造建築という観点で、ベトナムを北部から南部まで見渡してみると、そのスタイルは実に多様で、それぞれが独特である。ベトナムの木造建築には一つの基本形があり、それが文化や気候風土、地形に合わせて地域ごとに変化してきた。その結果、美しいバリエーションが生まれたというわけである。伝統木造建築は、その土地のアイデンティティでありながら、ベトナム建築としての原型を保ち続けている。
そのバリエーションについては、これまでの調査により大部分が明らかにされ、多くの詳細図、スケッチ、写真などとともに公開されてきた。こうして、多様、独特でありながら統一感があるという、ベトナムにおける木造建築の全体像が見えてきた。

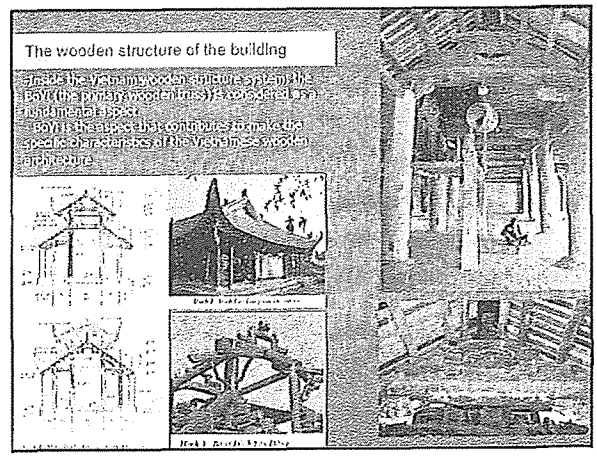

VIETNAMESE TRADITIONAL
WOODEN ARCHITECTURE
Mr. Nguyễn Đình Toàn
Doctor, Architect
Director
National Institute of Architectural Research
Ministry of construction
Vietnam

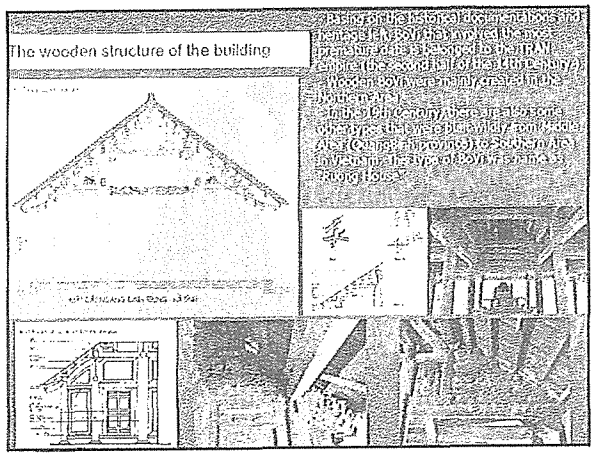

Vietnamese Wooden Architecture


Type of Vietnamese Wooden Architecture


Type of Vietnamese Wooden Architecture


Type of Vietnamese Wooden Architecture


The wooden structure of the building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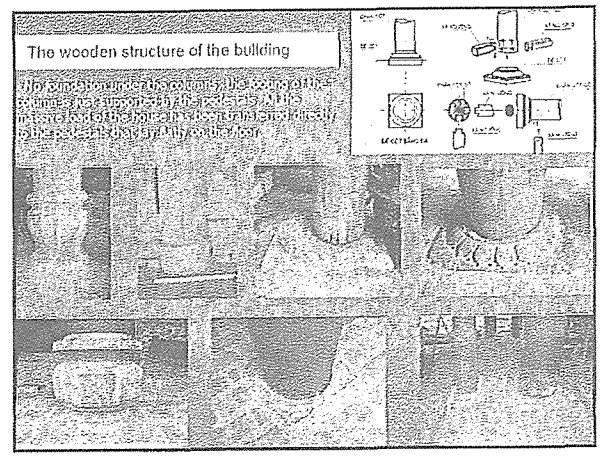
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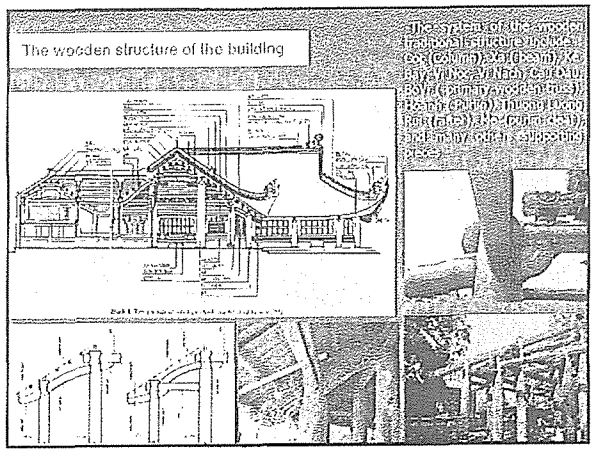
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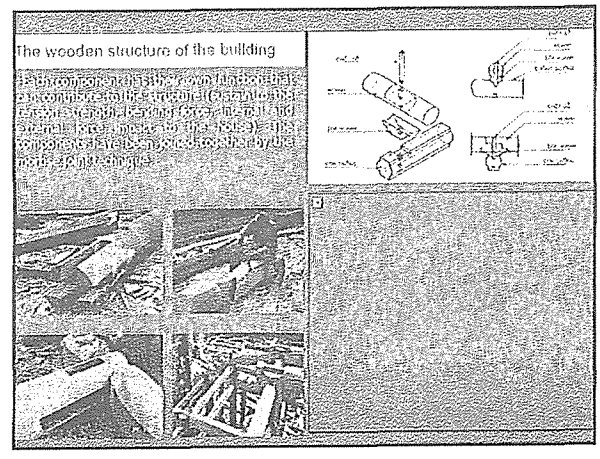
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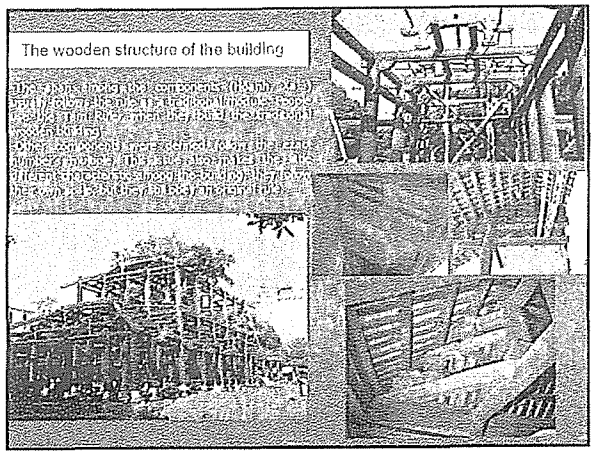
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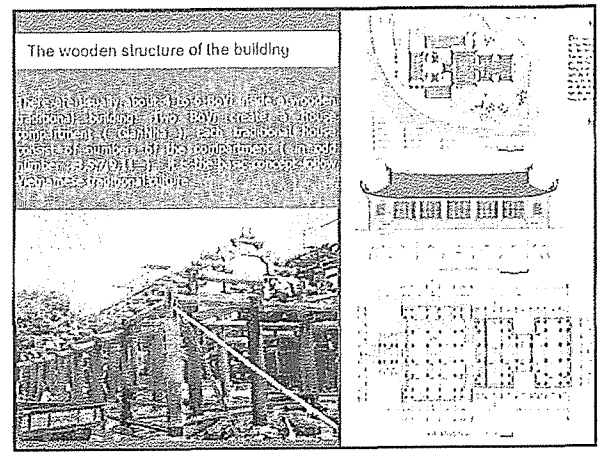
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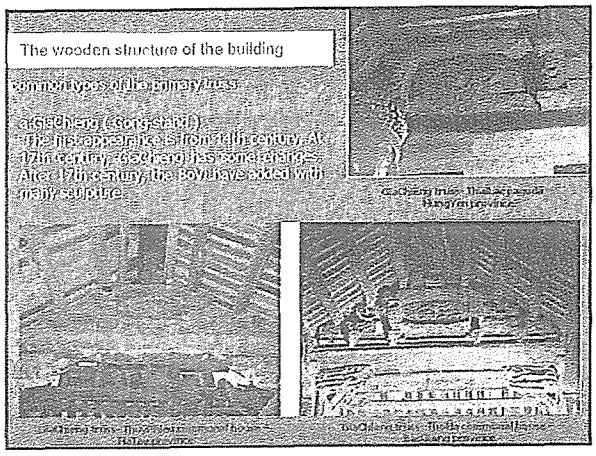
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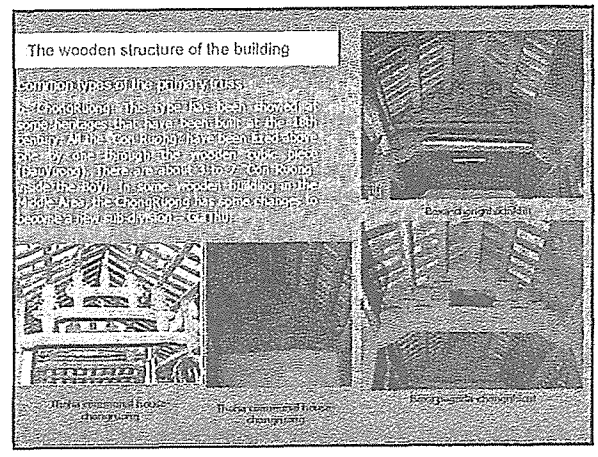
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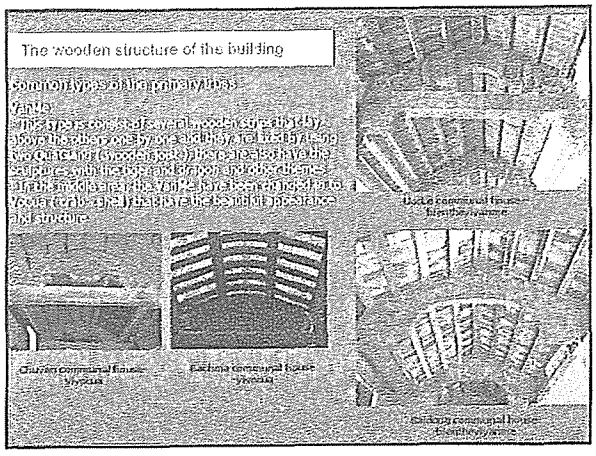
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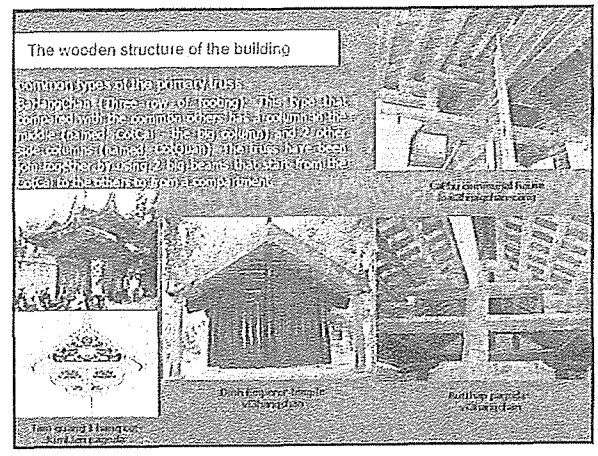
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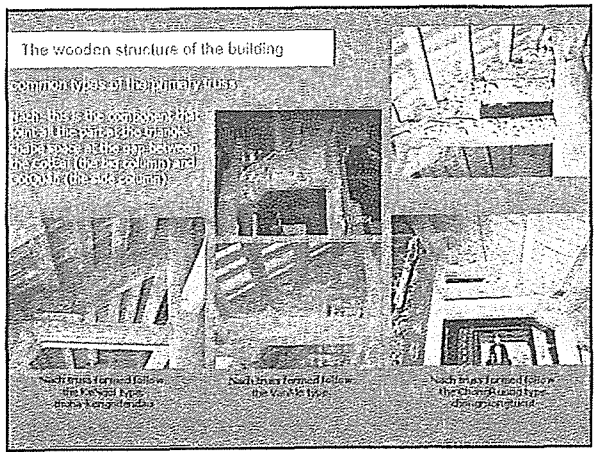
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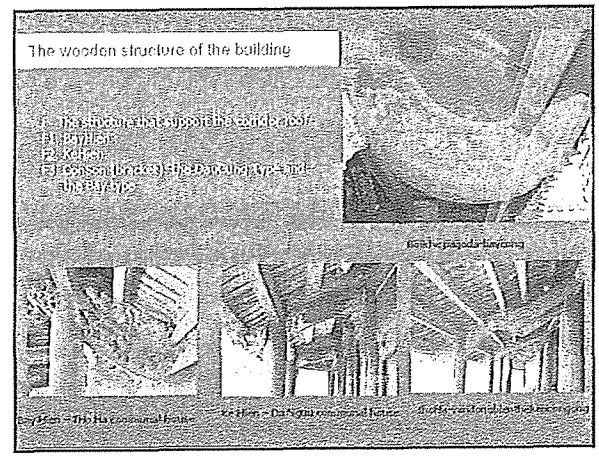
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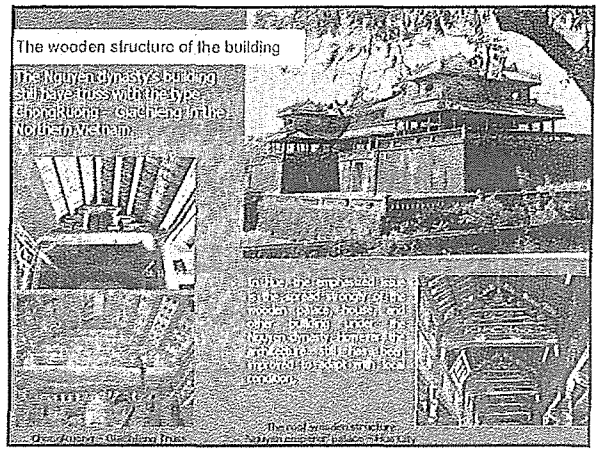
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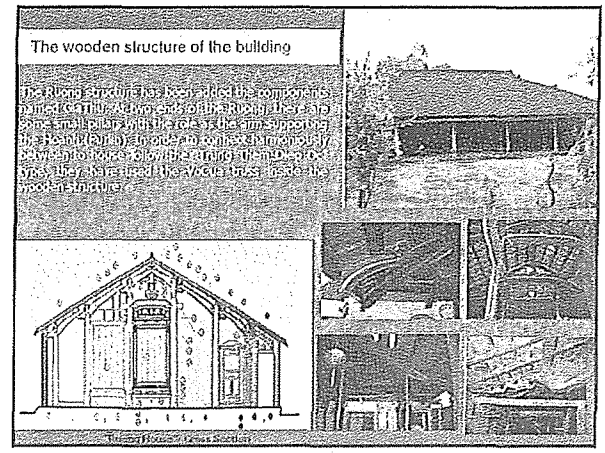
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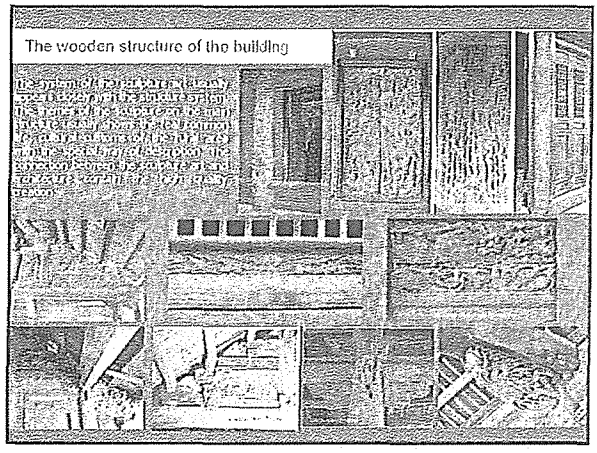

The wooden structure of the building

１２．日本における木造建築技能者の現状と課題

藤澤　好一　教授

アジア木造建築フォーラム 2007

日本における
木造建築技能者の現状と課題

藤澤 好一

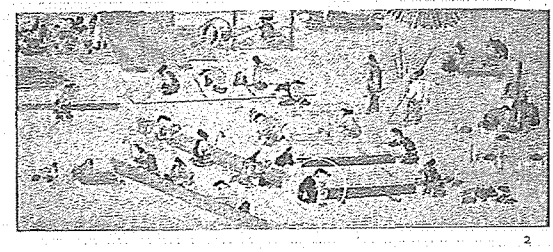
1.木材を利用する技術
　わが国大工の優れた能力
2.住宅生産システムの変化がもたらしたもの
　大工の役割、能力の変化
3.大工(木造建築技能者)の就業、就労の現況
　零細化、一人親方化の問題
4.大工育成の現状と課題
　創線の現場・東京建築カレッジの取組みから

1

1.木材を建築に用いてきた歴史

大工の木工作業と道具

寺社建築絵巻 竹林院造営の絵巻図ー鎌倉時代末(1309)作成
木材加工の過程と道具が見られる。墨壺の使い方(表目)も



2

木造建築が長寿命となる条件

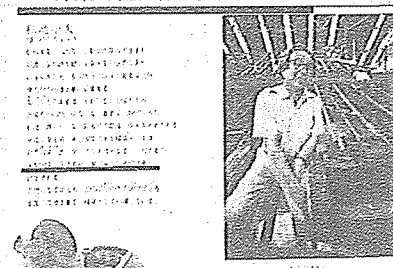
維持・保存のシステム＝木×技×周期的修理

●国宝の建築は全て木造
●北は岩手県中尊寺金色堂から南は長崎県大浦天主堂、奥福寺まで211 件、255 棟の建造物

●木造建築の維持に携わるのは、大工はじめ左官、屋根葺職など

しかし、その評価は建物に比べ、必ずしも高くない。

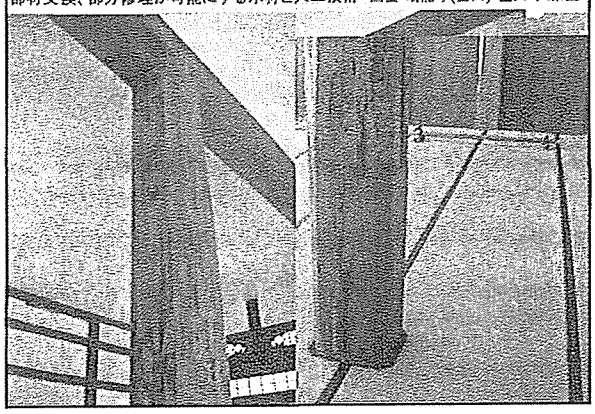
技術者の人間国宝
正式名称は選定保存技術保持者



当住山寺三重塔(国宝・京都)
鎌倉前期(1214年頃)

4

部材交換、部分修理が可能にする木材と大工技術　国宝・瑞龍寺(富山)-雲文・大茶堂

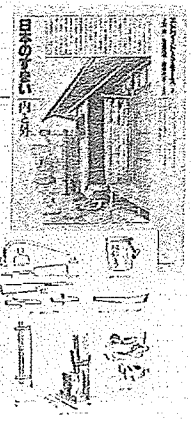


「大工」の呼びかた、役割の変遷
グランドマスター(大匠師)から「木材」を加工し、建物を建てる職人へ

- 大工〈おおいたくみ〉律令時代、国家建設事業役所の技術系長官
- 木工大工〈もくだいこう〉奈良・平安時代、造営工事に携わる工匠の最高指導者
- 番匠〈ばんじょう、もとは番上〉中世、木工の長、職業集団「座」の統率者
- 棟梁〈とうりょう、建築構造の頂部、要の部材〉建築工匠の指導者
  大工〈だいく〉現在のような職種名称に
- 惣大工、御大工、棟梁　工事全体の統括者
- 大工頭　江戸時代、幕府作事奉行の工事統括者
- 大棟梁　設計監理責任者

6

優秀な日本の大工



日本の大工のほうが、技術にかんするかぎり、はるかに優秀だ、と自信をもっていえる。

日本の大工は、その仕事じたいがすぐれているばかりか、あたらしいものを創造する能力においても、アメリカの大工よりすぐれている。

日本の大工や指物師は、平面図をみて、それが、あたらしい、みなれない方法でえがかれていたり、対象自身がまったく未経験なものであったとしても、辛抱づよくこれに対処し、けっきょく、うまくしあげてしまうのである。

大工の西洋技術への対応-明治期の疑洋風建築など

□ *清水喜助、辰島岩吉など今日のスーパーゼネコンの礎を築いた*

2代目清水喜助・築地ホテル館/第一国立銀行

旧開智学校・明治6年・立石清重

8

TOYOTA・佐吉も大工だった。

障子を開けてみよ 外は広いぞ

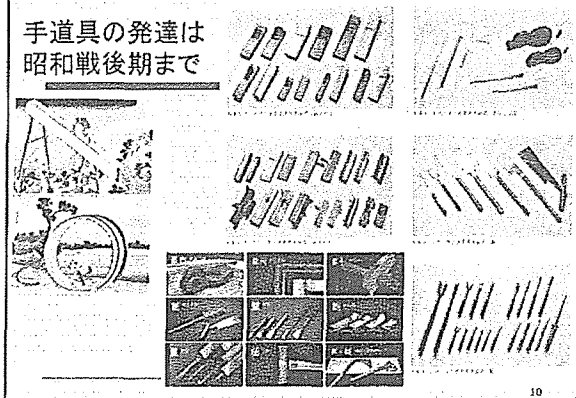
豊田佐吉、慶応3年(1867)吉田領山口村(現・湖西市)生れ父・伊吉は大工、佐吉も後を継ぎ大工になったが、発明・工夫の夢捨てられず、東京・内国勧業博覧会で見た外国製織機をモデルに独力で「豊田式木製人力織機」を発明。

コストの安い木を多用して、当時高価だった金属類は必要最小限に抑え、外国産の機械より一桁安い価格で瞬く間にシェアを広げた。

フリー百科事典『ウィキペディア(Wikipedia)』より

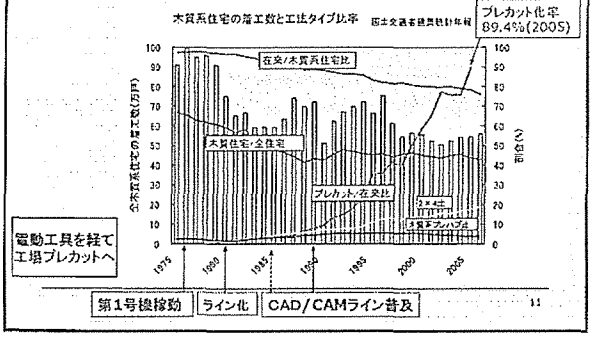
9

手道具の発達は昭和戦後期まで



10

2.住宅生産システムの変化　・工法の多様化 促したもの、もたらしたもの



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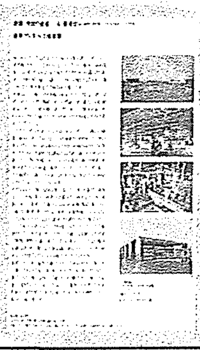
住まいづくり60年-工務店の戦後史

1945 ～ 昭和 25	物資難	住宅難、資材難
1950 ～ 昭和 30	復興インフレ	資金難
1955 ～ 昭和 35	工業化	電動工具
1960 ～ 昭和 40	都市化	新建材
1965 ～ 昭和 45	車社会	プレハブ
1970 ～ 昭和 50	高度成長	住宅ローン
1975 ～ 昭和 55	オイルショック	ツーバイフォー
1980 ～ 昭和 60	市場開放	木造住宅振興
1985 ～ 平成 2	バブル期、狂乱物価	人手不足
1990 ～ 平成 7	低成長期	昼から貸、住宅保証
1995 ～ 平成 12	IT化	ネットワーク化
2000 ～ 平成 17	高齢化社会	サービス化
2005 ～ 平成 22	耐震偽装	消費者保護規制
2010 ～ 平成 27		

7

変貌する生産システム

プレカットの最新事情→
建築雑誌 2006年4月



巨大化(月産6.2万坪)、高生産性ライン(3倍)

1,550棟/40坪/月←30坪/時間×20時間/日

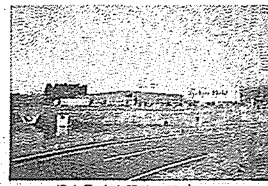
価格競争力(坪2,500円) ←1人日/坪(大工)

販売エリア、シェア拡大(滋賀甲賀工場新設)

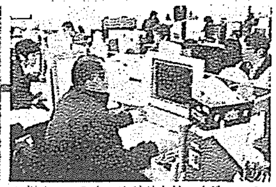
木材の国際マーケット支配(港→陸送拠点)

生産情報の国際化(IT効果)

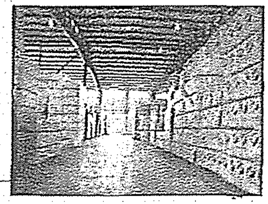
木造構工法、生産システム支配(EW、P・P、M・・・)



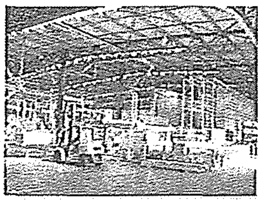
工場全景/全上屋約10万㎡



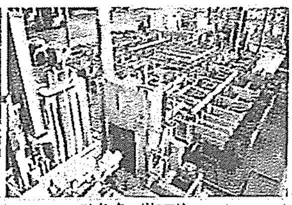
工場内CAD入力←南島谷本社←大連CADセン



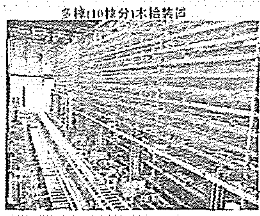
資材入荷・看板方式

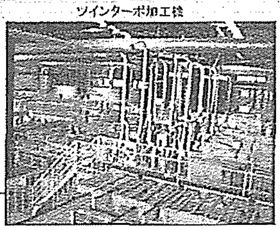


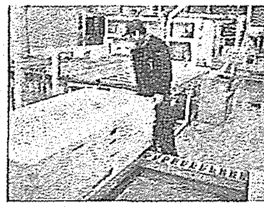
多棟(10棟分)木拾装置



ツインターボ加工機

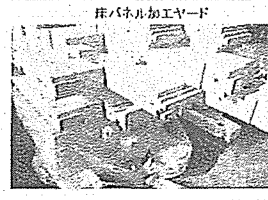




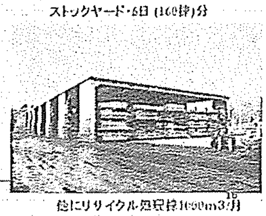


床パネル加工ヤード

ストックヤード・6日(160棟)分



加工された仕口・継手



他にリサイクル処理棟1660m3/月

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プレカットがもたらしたもの

- □流通　-商社化
- □形質　-乾燥KD材、集成材、金物化
- □価格　-価格競争化
- □扱い資材　-複合化、拡大化
- □梱包　-パッケージ化、前後工程対応
- □木材資源　-有効利用、再資源化

- □情報　-簡略化、外注化・電子化

- □建て方　-資材先行型
- □仕掛かり期間-短期化、直前化
- □大工技能　-技能の分化

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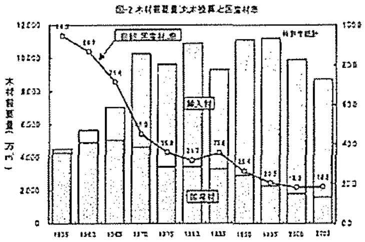
木材自給率の低下加速

調達の安定(コスト・品質・量)が最大要因



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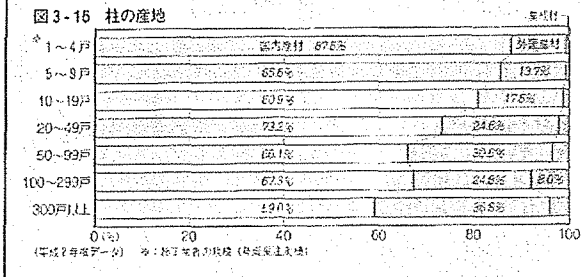
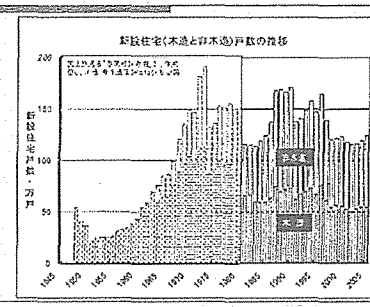
国産材を利活用してきたのは 地域の大工・小規模工務店



住宅金融公庫監修「図解・日本の住宅がわかる本」PHP研究所より　19

木造(戸建て)住宅のシェアは大きく、ストックの耐震改修も急務

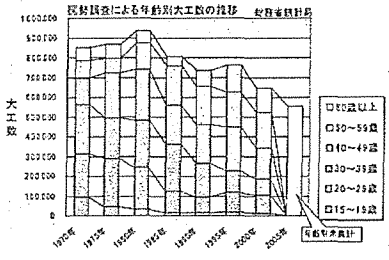
1981(昭和56)年以前の住宅、約1200万棟が耐震改修が必要とされている。



20

木造住宅の生産現場の担い手の確保はできるか

大工の減少と高齢化が進んでいる



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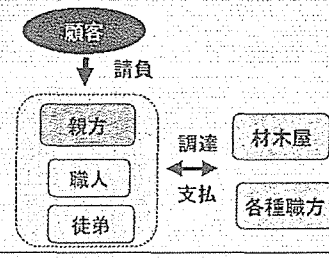
3.大工職人から事業者、経営者へ - 就労・就業の様態-

工務店の組織-プロトタイプ

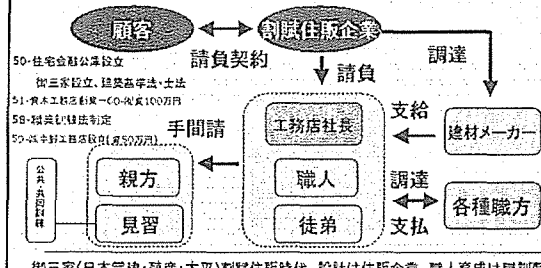
大工棟梁型工務店生産システム



大工の親方が工務店社長となり「請負」。設計は顧客の注文を具現、職人は内部育成

工務店の組織-金融機能の介在

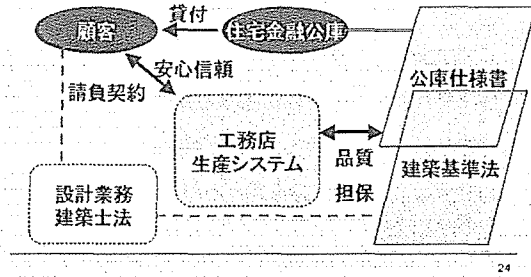
住宅金融会社支配型工務店生産システム



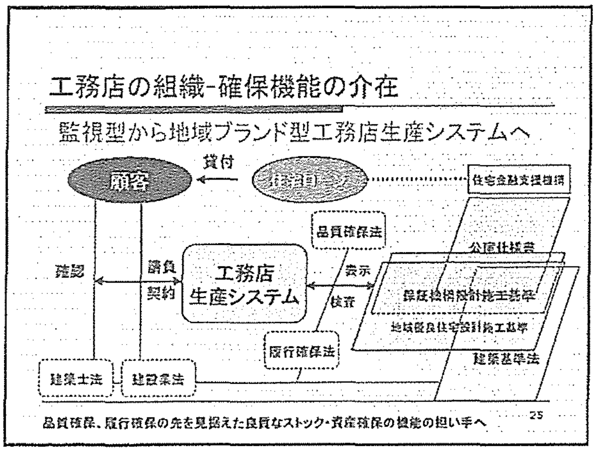
御三家(日本管建・積産・太平)割賦住販時代。設計は住販企業、職人育成は親御制に

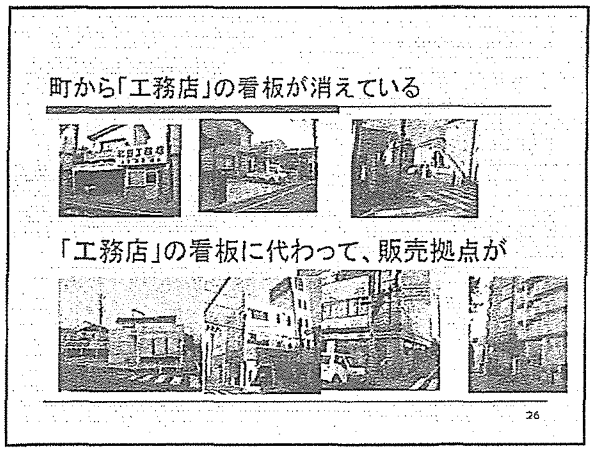
工務店の組織-金融機能の介在

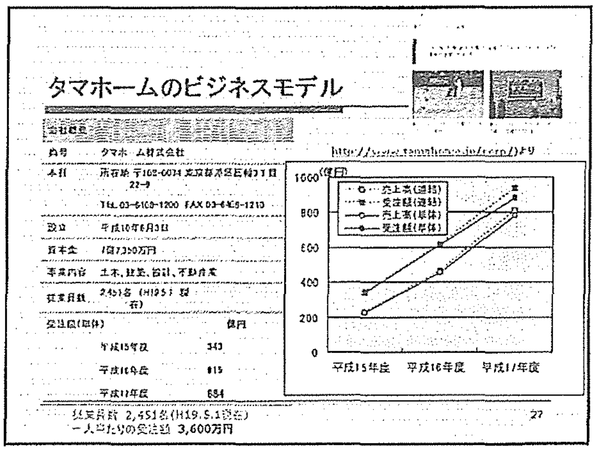
住宅金融公庫介在型工務店生産システム

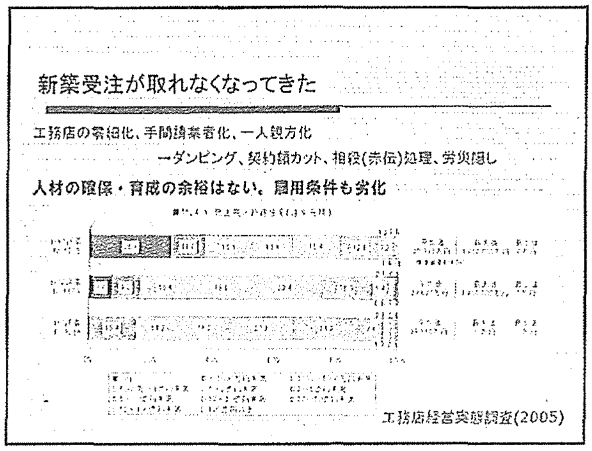


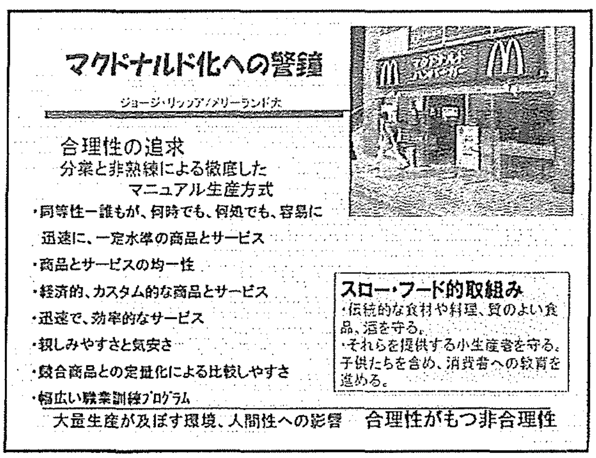
24

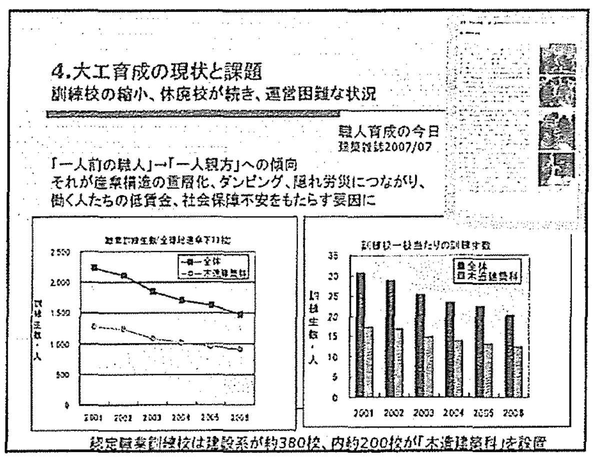

工務店の組織-確保機能の介在
監視型から地域ブランド型工務店生産システムへ
顧客
貸付
住宅金融支援機構
品質確保法
公庫仕様書
確認
請負
契約
工務店
生産システム
表示
検査
履行確保法
地域優良住宅設計施工基準
建築基準法
建築士法
建設業法
品質確保、履行確保の先を見据えた良質なストック・資産確保の機能の担い手へ
25


町から「工務店」の看板が消えている
「工務店」の看板に代わって、販売拠点が
26


タマホームのビジネスモデル
受注額(単体) 億円
平成15年度 343
平成16年度 615
平成17年度 854
1000 (億円)
800
600
400
200
0
売上高(連結)
受注額(連結)
売上高(単体)
受注額(単体)
平成15年度 平成16年度 平成17年度
従業員数 2,451名(H19.5.1現在)
一人当たりの受注額 3,600万円
27

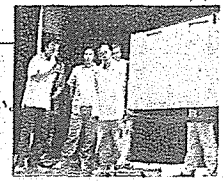

新築受注が取れなくなってきた
工務店の零細化、手間請業者化、一人親方化
—ダンピング、契約額カット、相殺(赤伝)処理、労災隠し
人材の確保・育成の余裕はない。雇用条件も劣化
工務店経営実態調査(2005)


マクドナルド化への警鐘
ジョージ・リッツア/メリーランド大
合理性の追求
分業と非熟練による徹底した
マニュアル生産方式
・同等性ー誰もが、何時でも、何処でも、容易に
迅速に、一定水準の商品とサービス
・商品とサービスの均一性
・経済的、カスタム的な商品とサービス
・迅速で、効率的なサービス
・親しみやすさと気安さ
・競合商品との定量化による比較しやすさ
・幅広い職業訓練プログラム
スロー・フード的取組み
・伝統的な食材や料理、質のよい食品、酒を守る。
・それらを提供する小生産者を守る。
子供たちを含め、消費者への教育を進める。
大量生産が及ぼす環境、人間性への影響 合理性がもつ非合理性


4.大工育成の現状と課題
訓練校の縮小、休廃校が続き、運営困難な状況
職人育成の今日
建築雑誌2007/07
「一人前の職人」→「一人親方」への傾向
それが産業構造の重層化、ダンピング、隠れ労災につながり、
働く人たちの低賃金、社会保障不安をもたらす要因に
全体
木造建築科
2001 2002 2003 2004 2005 2006
訓練校一校当たりの訓練生数
認定職業訓練校は建設系が約380校、内約200校が「木造建築科」を設置

4.大工育成の現状と課題　　全建北連・第34回全国職業訓練生交流集会 2006/6/15

将来への不安、悩み 5K～



■給料が安い。一人前になっても給料が安い。
■休日がない。休みが一定しない。
■汚い。身体で汚れる。ホコリを吸う。断熱材がかゆい。
　鼻毛が伸びる。日焼け、肌が荒れる。
　虫が一杯いる。グラスウールが嫌。
■きつい。単管が重い。ボードをやると手が荒れる。
■危険な作業なので怪我が多い。
○道具に金がかかりすぎる。道具が高い。
メーカー仕事が多い。工法が決まっていてプラモ感覚
工期が決まっていて最後が徹になる。朝が早い。
○国産の材料を使う仕事が少ない。
職人によって言うことが違う。親方がやっつけ大工。親方が父なのでなあなあに。
先輩大工の言うことが一人ひとり違う。
宮大工と普通大工との価値観の違い。
職人のタバコマナー。コーヒーばかりで太った。

31

職業教育と職業訓練

□ 職業訓練法(1958)
　労働者に対して職業に必要な技能を修得させ、又は向上させるために行う訓練
□ 新職業訓練法(1969)
　技能労働者に必要な能力・・・
□ 改正職業訓練法(1978)
　労働者の職業に必要な能力を開発し、及び向上させるために職訓を行う

■ 教育基本法(1947制定、2006全面改正)
「家庭教育及び勤労の場所その他、社会において行われる教育は、
　国及び地方公共団体によって奨励しなければならない」(旧)
「個人の要望や社会の要請にこたえ、社会において行われる教育は、
　国及び地方公共団体によって奨励されなければならない」(新)

32

職業能力の概念

□ 技能skills
　仕事の勘・コツの体得
□ 知識know ledges
　技能に関する知識
□ 態度attitudes
　仕事に対する取り組みの姿勢・心がけ
●三者の有機的緊連+情報処理能力
　斉藤将「職業教育訓練法制の研究」

33

技術と技能

□ 技術
　理論に基づき、分析的で普遍性をもち、機械や自動化、ロボット化になじみやすい。効率:efficiencyの追求
　学校で教えられるのが技術
□ 技能
　個人の経験に基づき、総合的で個別性をもち、直感的で道具を身体の延長として使う。効果:effectの追求
　現場で覚えるのが技能

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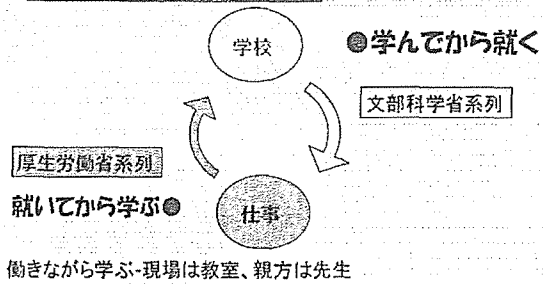
受益者は誰か、

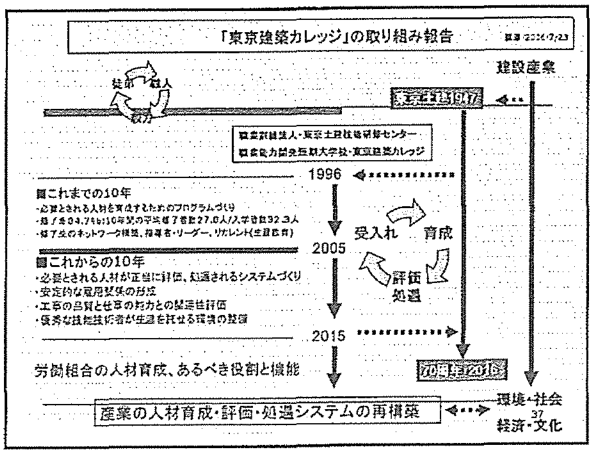


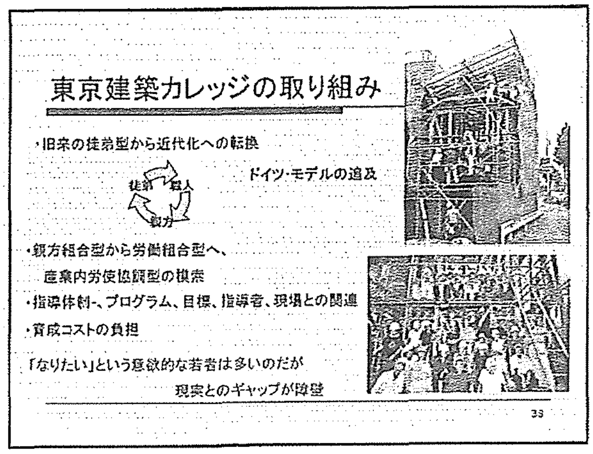
働きながら学ぶ-現場は教室、親方は先生
On the Job Training

35

On the Jobか、 Off the Jobか

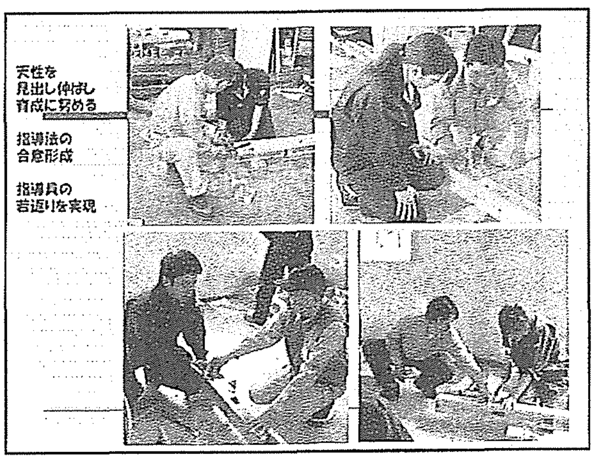
Job(仕事、現場)→ 職業か、企業か、産業か
・オキュペーション occupation 時間職
・トレード trade 熟練職
・プロフェッションprofession 専門職
・ボケーションvocation, コーリング calling 天職
わが国の企業(内部育成→終身雇用、年功序列)
・単純工、単能工、専門工、多用工、多能工
・デュアルから、トリプル、マルチへ
→建設産業は経営資源/生産要員の外部依存体質。

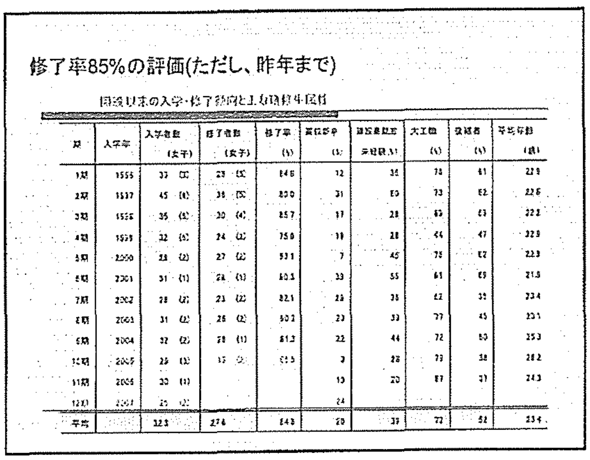

「東京建築カレッジ」の取り組み報告
建設産業
徒弟
職人
能力
1996
■これまでの10年
2005
受入れ
育成
評価
処遇
■これからの10年
・必要とされる人材が正当に評価、処遇されるシステムづくり
2015
労働組合の人材育成、あるべき役割と機能
70周年[2016]
産業の人材育成・評価・処遇システムの再構築
環境・社会
経済・文化
37


東京建築カレッジの取り組み
・旧来の徒弟型から近代化への転換
ドイツ・モデルの追及
徒弟
職人
能力
・親方組合型から労働組合型へ、
産業内労使協調型の模索
・指導体制、プログラム、目標、指導者、現場との関連
・育成コストの負担
「なりたい」という意欲的な若者は多いのだが
現実とのギャップが障壁
38


・手道具中心
・自然木材対応
・伝統的仕口継手、金物排除
・全工程体験、関連職種体験
実習棟建設を通じた体験学習


2007年新入生の集中実習


天性を
見出し伸ばし
育成に努める
指導法の
合意形成
指導員の
若返りを実現


修了率85%の評価(ただし、昨年まで)

継続できなくなった理由

退学理由

経済的理由(学費を納められない)	2人	4.3%
事業所の都合(通学を保障する環境でなくなった)	5人	8.5%
職種が自分に適していなかった	8人	12.8%
学習意欲がなくなった、病気	16人	27.7%
仕事に専念したい(仕事が増加、責任ある立場になって)	13人	25.5%
進路変更(進学するなど)	6人	8.5%
その他(結婚、解雇、カレッジに不満、退職)	5人	12.8%
計	55人	100.0%

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カレッジ生への指導と現実のギャップ

Off the JOB での指導方針	On the JOB で命ぜられる仕事
1. あいさつ≫	1. ボード≫ボード類の運搬、取付
2. 道具つくり≫	2. ダンネツ≫断熱材の取付
3. 掃除≫	3. カナモノ≫金物の取付
4. 段取り≫	4. アトカタシ≫後片付け
5. 考えを伝える ≫	5. カンコーヒー ≫買出し

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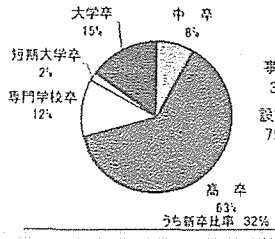
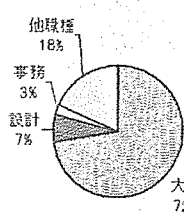
混成・複合の訓練

学歴構成(n=355)



職種構成(n=355)



他職種の構成	
建築総体	19
内装関係	19
設備関係	10
リフォーム	6
外装関係	6
現場監督	4
造園ほか	4
計	65

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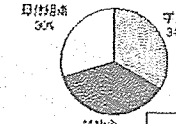
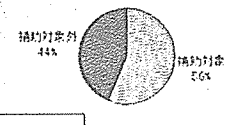
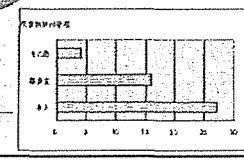
訓練費の内訳(収支構成)

収入内訳(一人当たり372万円)



支出内訳(一人当たり137.2万円)





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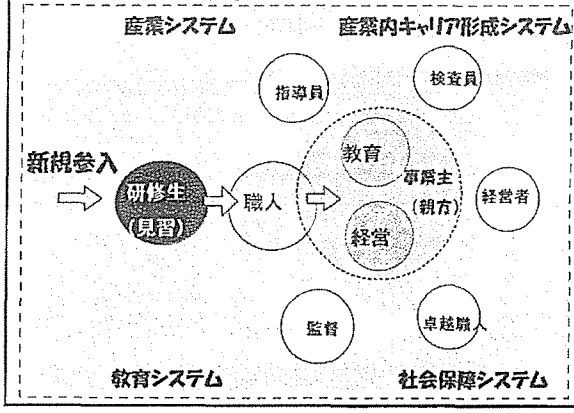
欧米の職業再生産システム



誰が費用負担するか、誰が育てるか -産業、社会の責任

地域の環境・文化・社会を守り、豊かにする木造建築技能者

その育成システム、基金の設立にむけて、アジア圏としての取組みと連帯を

ー欧米の例ー

■アメリカ・大工連合ユニオン
雇用主が大工の時間当たりの労働に対する定額(0.32ドル)の訓練工基金を支払う

■イギリス建設産業訓練評議会CITB・40職種
建設会社から定率(直用労働者の支払賃金の0.5%、及び労務供給下請けへの支払額の1.5%)で徴収

■ドイツ・建設産業
建設業経営者団体と労働組合で運営する社会金庫へ、全企業が労働費用に対する一定比率(2.8%)で負担

■フランス・成人職業訓練協会
全事業主は、雇用した技能労働者に支払った賃金の1%を職業訓練のための目的税として納付。ほかに内部育成費の留保

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ASIA Timber Construction Forum 2007

Current status and problems of Timber Construction Skilled Labor in Japan

Yoshikazu Fujisawa

1.Engineering with timber

Superior Ability of Japanese carpenters

2.What did the change in the housing product system bring about?

Change of carpenters' role and abilities

3.Current status of carpenters' job gains and situation on work site

The Problem of inclination of small companies and a single master carpenter

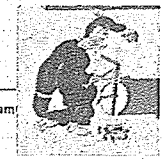
4.Current status and problems of carpenters' training

On-the-job training activities and Tokyo Architecture College

1

1. History of timber use in building

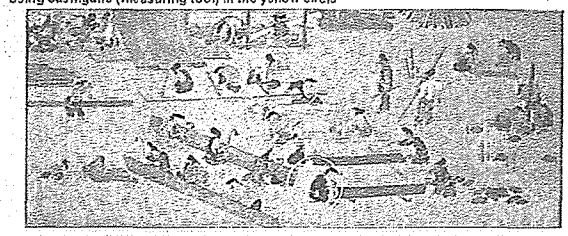
Carpenters' work and tools



Picture scroll of construction of Takebayashi house (1309, Kamam

You can see the process of timber products.

Using sashigane (measuring tool) in the yellow circle



2

Necessities to ensure long life of timber structures

System of maintenance and preservation

=Timber x Engineering x Periodic maintenance

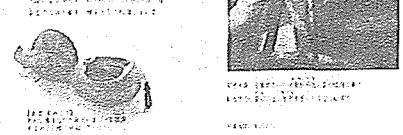
- All national treasure buildings are timber structures.
- 255 buildings from Konjiki-do Chuson-ji(Iwate pref.) in the north of Japan to Oouratenshu-do and Suihuku-ji (Nagasaki pref.) in south Japan
- Carpenters, plasterers and roofers etc. are responsible for maintenance of these buildings.

Given the importance of these buildings, these craftsmen are not given the respect and credit that they deserve?

3

A master craftsman who is a living national treasure? (formal nomenclature is "a holder of selected preservation technique")

Shoji Matsuura

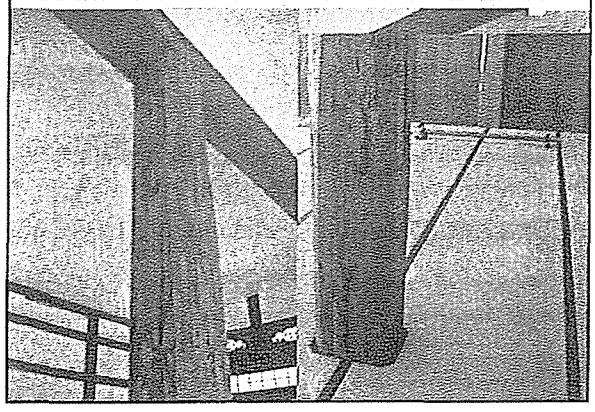


Kaijyusen-ji: 6 story tower (National treasure,Kyoto) (1214, early Kamakura era)

4

Timber structures can be partially changed or repaired by skilled carpenters

National treasure: "Zuiryu-ji" (Toyama pref.)/ Important cultural property: "Daicha-do"



Change of the name and role of carpenter

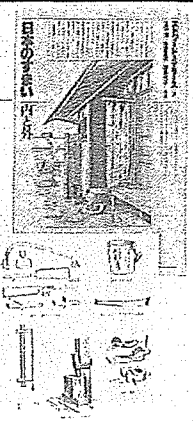
from grand master to engineer, in order to process timber and construct buildings

- "Oitakumi" about 8th cen.: an engineering administrator of National Ministry of Construction
- "Mokudaikou" 8th to12th cen.: a superior supervisor of engineers dealing with construction
- "Banjou" 12th to 16th cen.: a master woodworker or leader of "Za" (group of engineers)
- "Toryou" (ridge beam): a leader of architectural engineers

  "Daiku": a carpenter, as they are called today
- "Sodaiku", "Odaiku" or "Toryou": a supervisor of all of the construction work
- "Daiku-gashira" 17th to 19th cen.: a construction supervisor of magistrate's office
- "Dai-Touryou": a designer and supervisor

6

High capability of Japanese carpenters



Author confidently says Japanese carpenters have better technique than American carpenters.

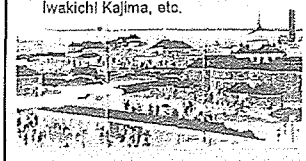
Japanese carpenters are not only highly capable in their engineering skills, but also have superior ability to create new things.

Even if the objects are drawn in a new or *unfamiliar manner and had never been made*, Japanese carpenters and cabinetmakers can carry out the work.

"Daiku" response to western technique

Western style buildings in Meiji era (19th cen.)

- Founders of super general constructor: Kishuke Shimizu, Iwakichi Kajima, etc.



Kisuke Shimizu II
Tsukiji Hotel/The 1st National Bank

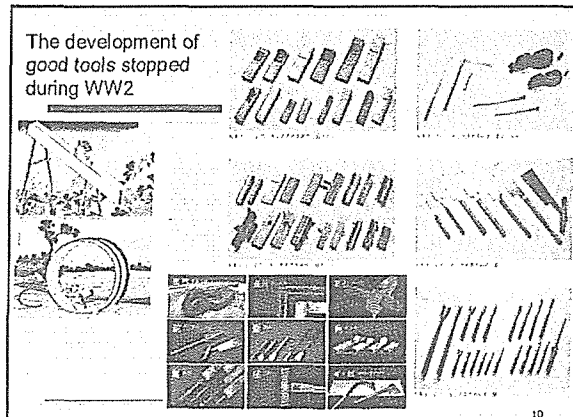
Kiyoshige Tateishi: Former Kaichi-school (1873)

Sakichi Toyota was also a carpenter.

Open paper panel door, outside is wide.

Sakichi Toyoda was born in 1867 on the westside of Lake Hamana. His father, Isuke, was a carpenter and Sakichi followed in his father's footsteps. But he couldn't forget his dream of becoming an inventor, and he had invented "the Toyota human-powered wooden weaving machine" after he saw a foreign made weaving machine at an exposition. It sold extremely well, because it was made with mostly wooden parts, which were cheaper than

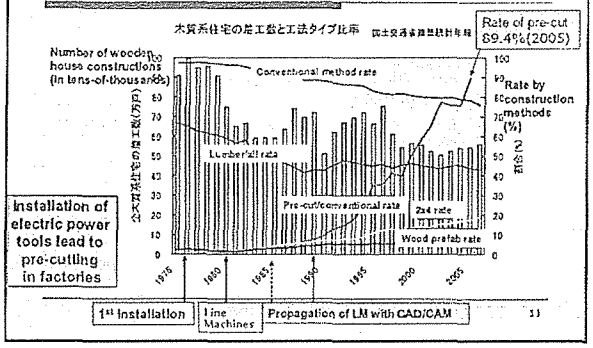
The development of *good tools stopped* during WW2



10

2. Change of housing production system

・What did the diversity of construction method bring *about?*



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60 years of housing history of homebuildings after WW2

1945 ~	Lack of materials	Lack of housing & materials
1950 ~	Inflation at reconstruction	Lack of financing
1955 ~	Industrialization	Electric power tools
1960 ~	Urbanization	New materials
1965 ~	Motorized society	Prefabrication
1970 ~	High-growth period	Home loans
1975 ~	Oil shock	2x4s
1980 ~	Market Opening	Promotion for wooden housing
1985 ~	Bubble era	Shortage of labor
1990 ~	Period of low growth rate	Quality assurance of housing (rather than quantity)
1995 ~	IT	Networks
2000 ~	Aging society	Trend toward service economy
2005 ~	Cheating in structural design	Consumer protection laws
2010 ~		

Transfiguration of product system

Latest news of Pre-cut

Mammoth factory(205,000m2/month), Highly productive Line (3times)

1,550 houses/132 sq meter/month
← 100 sq meter/hour×20hours/day

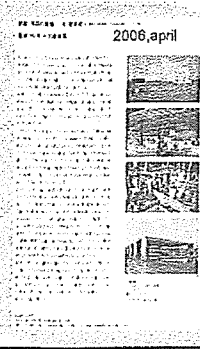
Price competitiveness(760 yen/sq.meter)
← 0.3 person-day/m2

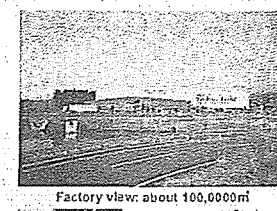
Sales area & share growing (Installation of New factory)

Domination of international timber market (port → land bases for transportation)

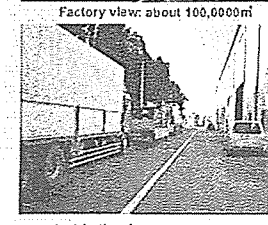
Internationalization of product information (IT effect)

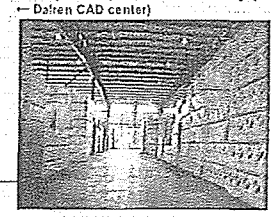
Domination of timber construction method and process system (EW, P.P, M, etc)

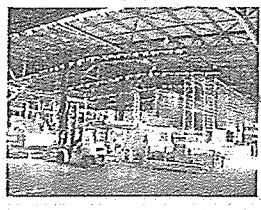


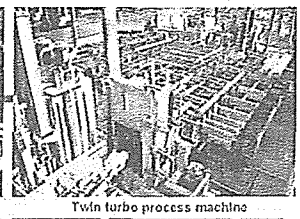

Factory view: about 100,0000m

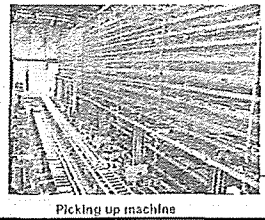

Factory CAD Input (← Minami Koshigaya HQ ← Daiken CAD center)

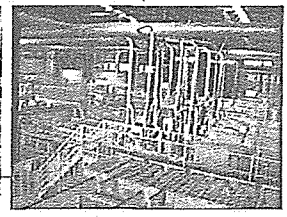


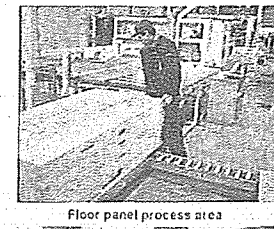

Just-in-time inventory system

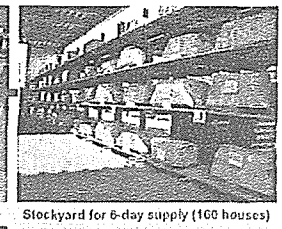


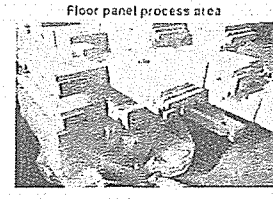

Twin turbo process machine

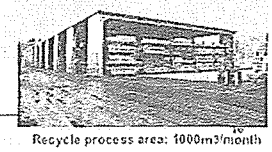



Picking up machine


Floor panel process area


Stockyard for 6-day supply (100 houses)


Processed joints and numbering


Recycle process area: 1000m3/month

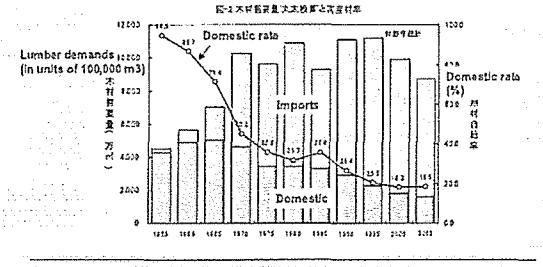
The overall effect of pre-cutting

- ☐ Distribution: Business firms
- ☐ Material: Dried knock down, Laminate lumber, Metal materials
- ☐ Price: Competition
- ☐ Way to deal with material: Integration, Enlargement
- ☐ Packaging: Packaging, Capability of anteroposterior processes
- ☐ Timber resource: Efficient use, Recycle
- ☐ **Information: Simplification, Outsourcing, Computerized**
- ☐ Home-building method: Materials first
- ☐ Preparation period: Shortened, just before actual construction
- ☐ Carpenter techniques: Differentiation of techniques

17

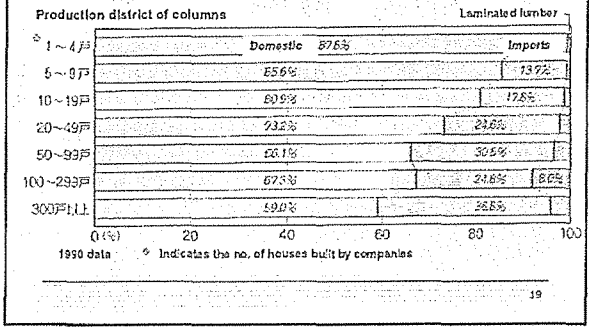
Percentage of domestic timber has plummeted rapidly

Biggest reason: stable supply of imported lumber (cost/quality/quantity)



18

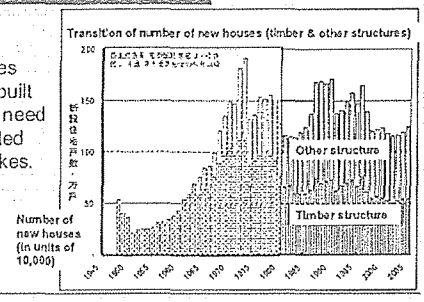
Small house-builders were the biggest users of domestic lumber



19

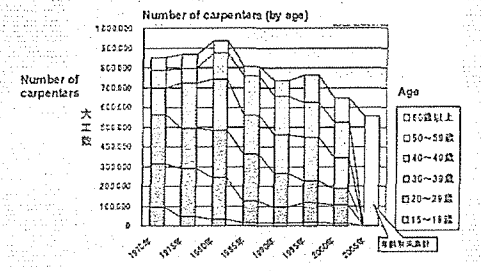
Share of timber structures (detached houses) is high; the seismic retrofitting of this stock is the urgent problem

About 1,200 million houses which were built before 1981 need to be retrofitted for earthquakes.



20

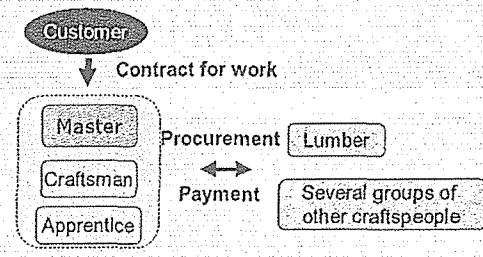
Shortage of carpenters and the problem of advancing average age



21

3. From carpenter to employer: work style

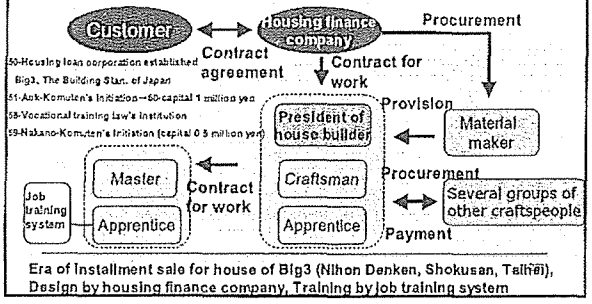
Framework of house builder: a prototype



Carpenter's employer (a master carpenter) becomes president of home builder company and designs houses at customer's request. Apprentices are trained on the job.

Framework of house builder: mediacy of financial function

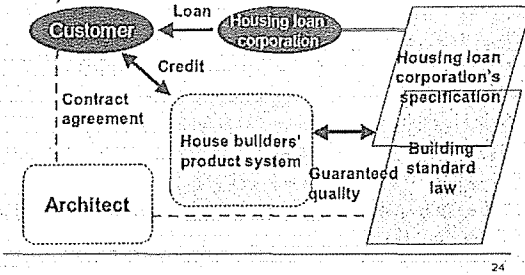
Product system of house builder controlled by housing finance company



Era of installment sale for house of Big3 (Nihon Denken, Shokusan, Taihei), Design by housing finance company, Training by job training system

Framework of house builder: mediacy of financial function

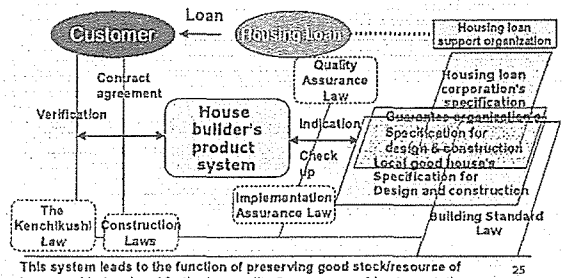
Procedure of house builder in the case of housing loan corporation's mediacy



24

Framework of house builder: mediacy of function for quality and implementation assurance

From supervision-type to local brand type



This system leads to the function of preserving good stock/resource of houses with the aim of furthering quality & assurance of implementation.

25

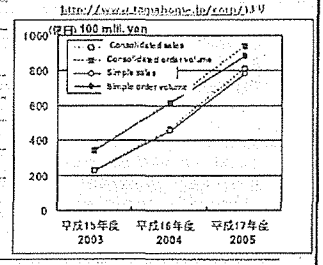
"Komuten (house builders)" are disappearing.

In their place, branch offices of home builders have appeared.

26

Business model of Tamahome

Company name	
Firm name	Tamahome
HQ	3-22-9 Takanawa, Minato-ku Tokyo
	TEL 03-5423-1200 FAX 03-5423-1210
Estab.	June 2, 1998
Capital	773.5 million yen
Description of business	Civil eng., Architecture, Design, Estate
No. of employees	2,451 may.2007
Order volume	100 million yen
2003	343
2004	615
2005	884



2,451 employees (1May.2007)

Order volume per person: 36 million yen

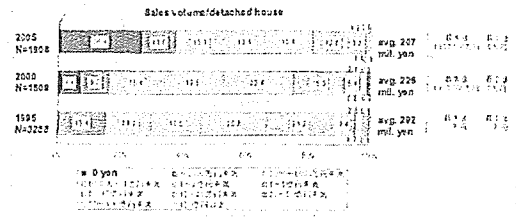
27

Orders for new construction have decreased drastically

The inclination of "smaller company", "sub-subcontractor" or "single master carpenter"

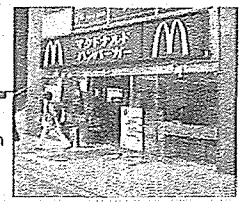
→Dumping, contract price cuts, setoffs, hiding labor accidents, etc.

They can't afford to get new apprentice carpenters and train them. Working conditions have gotten worse, too.



Warning bell for McDonaldization

George Ritzer/Maryland Univ.



Pursuit of rationality

Drastic manual product system for division of labor and nonexperts

- For equivalence: merchandise or service which anyone could get anytime, anywhere, easily, rapidly and at suitable quality
- Uniformity of merchandise or service
- Economical and custom made merchandise or service
- Rapid and efficient service
- Friendly
- Easy comparison with competition by quantification method
- Extensive job training program

Slow Food movement

- Preserve traditional food material, dishes and high quality food & liquor
- Protect those farmers who make slow food
- Promote education about Slow Food to consumers and children

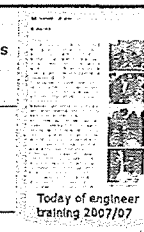
Effects on environment and humanity by mass production

Irrationality brought by rationality

29

4.Current status and problems of training carpenters

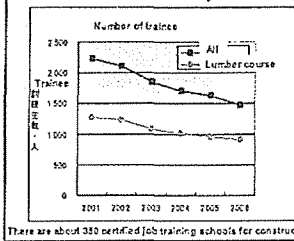
Tough conditions: shrinkage, temporary or permanent closing of training schools

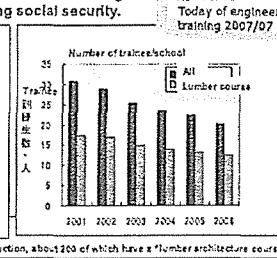


Today of engineer training 2007/07

"Proficient workman" → "Single master"

The above inclination has lead to a "layered structure of construction industry", "damping" and "hiding workman's compensation". These problems have lead to lower wages for workers and uncertainty of receiving social security.



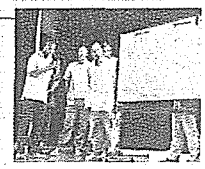


There are about 350 certified job training schools for construction, about 1200 of which have a "lumber architecture course".

4.Current status and problems related to carpenter training

Uncertainty about the future (5 items)

-Low wages even for workman with proficient skills
-Few holidays: difficult to take extended time off
-Dirty demolition work involves inhalation of dust, exposure to sun (sometimes causing sunburn), discomfort of handling glass-wool insulation and rough surfaces such as boards.
-Handling heavy iron pipes
-Many accidents due to the dangerous nature of the work
-Expensive tools
-Working from instruction manuals is boring.



As construction completion schedules are always very tight, workers must work fast and get real dirty. They must get up early in the morning for work.
-Rarely to use domestic lumber
-Instructions given vary according to the person. The master often does things "his way". When a carpenter's master is also his father, he is often ordered to compromise the work. Conflicts emerge due to different concepts that are valued by shrine and temple carpenters and ordinary carpenters.
-Carpenters often smoke a lot, with little or no regard for where they are and when they smoke. Many of them drink too much canned coffee and gain weight.

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Job education and training

- Job training law (1958)
  Training for apprentices to master necessary techniques and upgrade their job skills
- New job training law (1969)
  Training of necessary skills to become skilled laborer
- Revised training law (1978)
  Conduct job training to develop necessary skills and to improve them for their job

- Basic Education Law (founded in 1947, fully revised in 2006)

"Education conducted at home, work place or in society, etc. should be promoted by nation and local authority" (former law)

"Education conducted at society to respond to individual needs or society's request should be promoted by nation and local authority" (current law)

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Concept of vocational capability

- Skills
  Realize a divination and know-how for a specific vocation
- Knowledge
  Knowledge related to skills
- Attitudes
  Attitudes, mind-set and motivation related to jobs
- Coordination of the above three articles
  + Information handling ability

Masashi Saito "Research of vocational education training law"

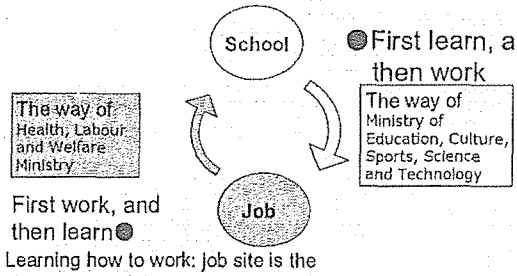
33

Technique and Skill

- Technique
  is relatively easy to learn for mechanization or automation because they are theoretical, analytical and universal
  Pursuit for efficiency can be learned at school
- Skill
  is all round on basis of individual experience and has severalty, and able to make him use viscerally tools as extension of his body
  Pursuit of effectiveness can be learned on the job

34

Who is the beneficiary?



Learning how to work: job site is the classroom and the master is a teacher

On-the-Job Training

35

"On the Job" and "Off the Job"?

Job (job, site)→ occupation, company or industry?

- occupation hourly workers
- trade
- profession, specialists
- vocation, calling

Company in Japan (inner education→lifelong employment, seniority system)

- unskilled workers, single-skill workers, specialized workers, utility workers, all-round workers
- from dual to triple or multi

→Construction industry tends to depend on management resources and on outside people

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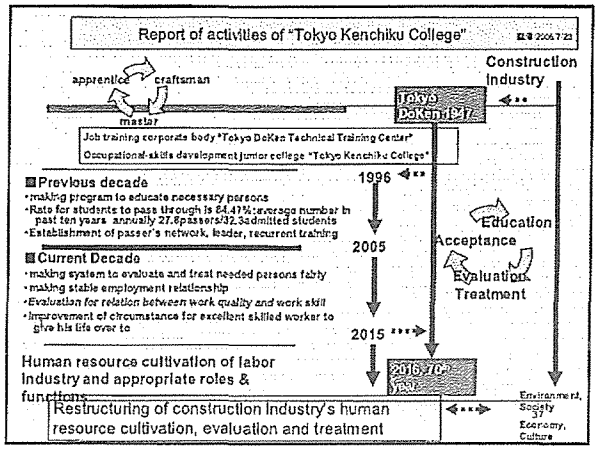
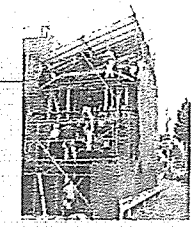
Report of activities of "Tokyo Kenchiku College"



Activities of "Tokyo Kenchiku College"



・Transformation from old apprentice system to modernization

Apprentice Craftsman Master — Pursuit of German model

・From boss-system union to labor union

Seeking harmonious labor relations within the Industy

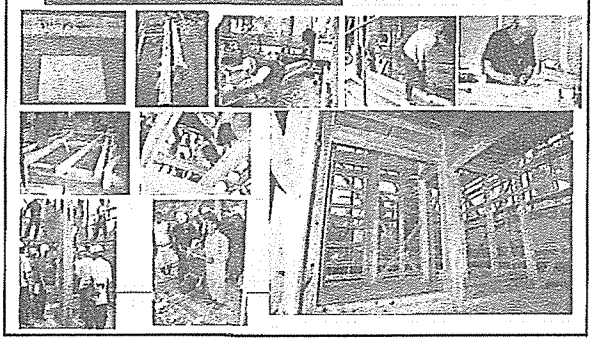
・Training-system program with clear aims, good leaders and linkage with work site

・Sharing of training burden

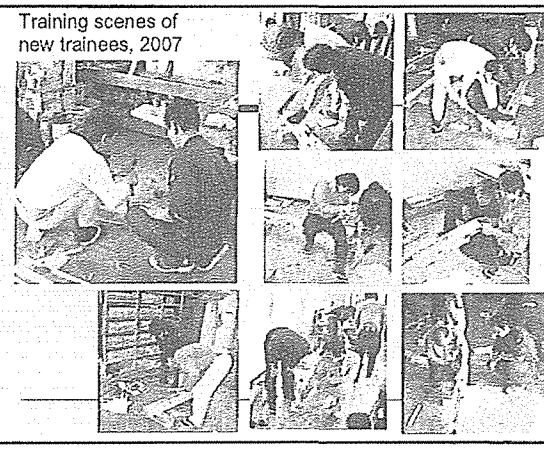
There are many young people who want to be skilled workers, but the difference between the ideal and the actual is an obstacle.

On-site training through the construction of training house

・Mainly manual labor
・Using natural materials
・*Traditional joints, no metal materials*
・Constant experience in the relevant field



Training scenes of new trainees, 2007



Determine aptitudes of apprentices, and develop them

Consensus building for teaching method

Achievement of rejuvenation of teachers

Average percentage of people who pass: about 85% (up to 2005)

Statistics since foundation, and main categories of apprentices

Period	Year	Enrollment (Female)		Passed (Female)		Passing rate (%)	High school graduates(%)	Amateur (%)	Carpenter (%)	Successor (%)	Avg. age(%)
1	1996	33	(3)	25	(3)	84.8	12	36	76	61	22.9
2	1997	45	(6)	36	(5)	80.0	31	60	73	62	22.5
3	1998	35	(5)	30	(4)	85.7	17	26	69	69	22.2
4	1999	32	(6)	24	(2)	75.0	16	25	44	47	22.8
5	2000	29	(2)	27	(2)	93.1	7	45	76	62	22.8
6	2001	31	(1)	28	(1)	90.3	30	55	81	69	21.9
7	2002	28	(2)	23	(2)	82.1	29	36	82	36	23.4
8	2003	31	(2)	26	(2)	83.9	23	39	77	45	23.1
9	2004	32	(2)	26	(1)	81.3	22	44	72	50	25.3
10	2005	29	(3)	19	(2)	65.5	3	28	79	38	26.2
11	2006	30	(1)				13	20	67	37	24.3
12	2007	25	(2)				24				
Ave.		32.3		27.8		84.8	20	39	72	52	23.4

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Reasons for dropping out

Economic matters (can't pay training fee)	2	3.6%
Can't go to school because of being transferred far away	5	9.1%
Not suited to construction job	8	14.5%
Not willing to study or sickness	16	29.1%
Becoming fulltime workers (more work or promotions)	13	23.6%
Decide to pursue higher education	6	10.9%
Others (marriage, disemployment, dissatisfaction, retirement)	5	9.1%
Total	55	100%

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The gap between teaching apprentices at the college and on the job site

Guiding principle of Off the JOB	Ordered Job On the JOB
1.Greetings≫	1.Board≫Conveyance and mounting of boards
2.Toolsmith≫	2.Insulation≫fitting of insulation
3.Cleanup≫	3.Metal≫mounting of metal
4.Prepartion≫	4.Cleanup≫
5.Communication ≫	5.Canned coffee ≫going to buy it

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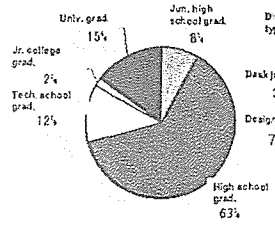
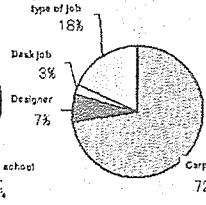
Training for blending/composition

Composition of Academic records (n=355)



Composition of job descriptions (n=355)

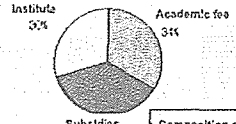


Composition of job descriptions	
Building frame	19
Interior	16
Mechanical	10
Remodel	6
Exterior	6
Site foreman	4
Gardener & others	4
計	65

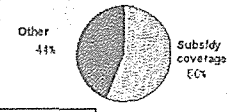
45

Breakdown of training fees (income and expenditures)

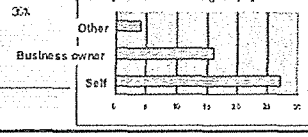
Breakdown of income (1,372 mil. yen/person)



Breakdown of expenditure (1,372 mil. yen/person)



Composition of training fee payer



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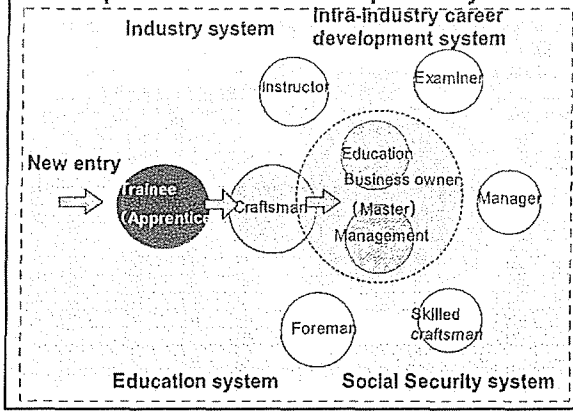
Europe & US career development system



Who bears the cost of training and train apprentices? -Responsibility of industry and society

Lumber architecture engineer could preserve local environment, culture, and society and even enrich them.

Let's start the activity and coalition for establishment of the training system and foundation.

—Examples in Europe & US—

■US·Carpenter associated union

Employer pays trainee's base rate (carpenter's hours worked times 32 cents per hour)

■UK Construction Industry Training Board 40 job descriptions

Collect the fee from construction companies at a specified rate (0.5% of wages for directly hired laborers and 1.5% of payment to sub constructors)

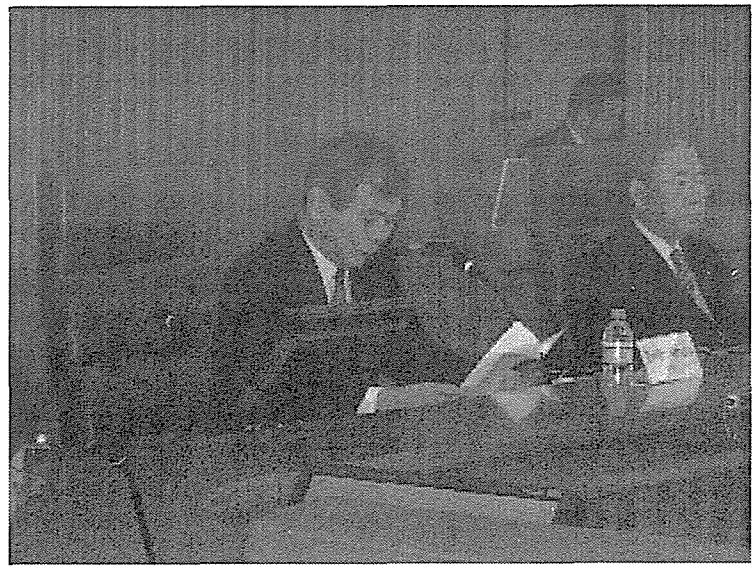
■Germany·Construction Industry

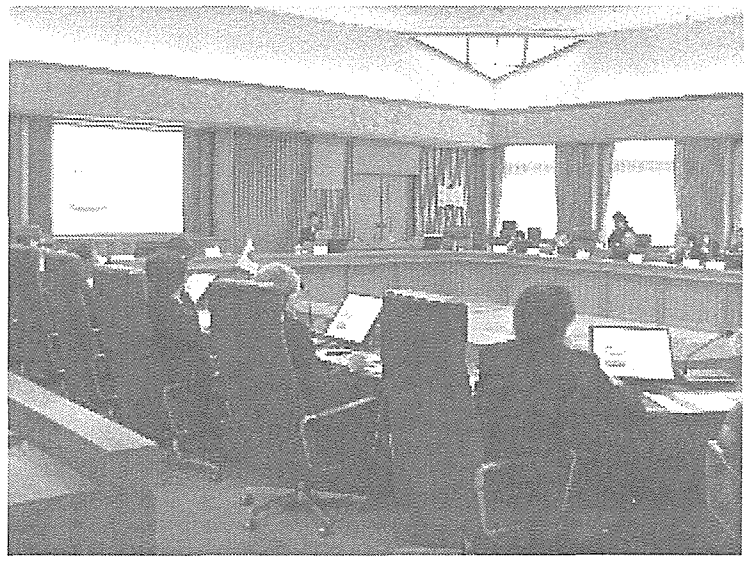
All companies pay the fee to an account administered by both the construction company employers' association and labor union at a particular rate (2.8% of labor wages)

■France·Job training association for adults

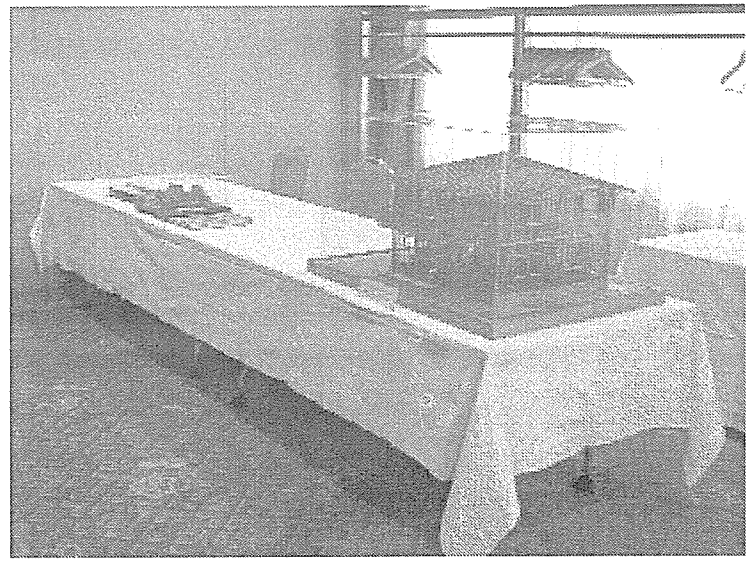
All business owners pay the fee at a specified rate (1% of wages paid for hired skilled laborers) as tax for job training and reserve inner training fee.

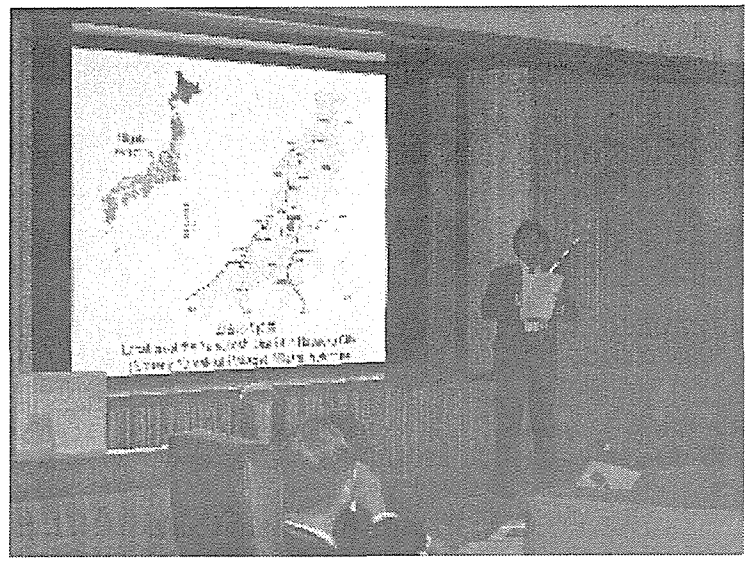
２．８　会議の様子

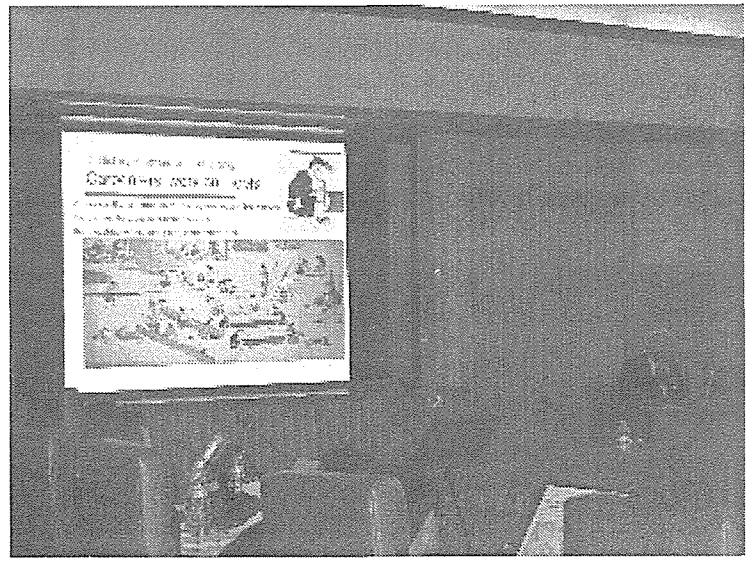





India







３章　現地視察の実施報告

３．１　開催日時・開催場所

２００７年１１月２８日(水)

現地視察：埼玉県

所沢市民体育館（近年の技術開発による大規模木造施設）

川越市（伝統的な木造建築物の街並み保存）

ものづくり大学（ものづくりに携わる技術者養成機関）

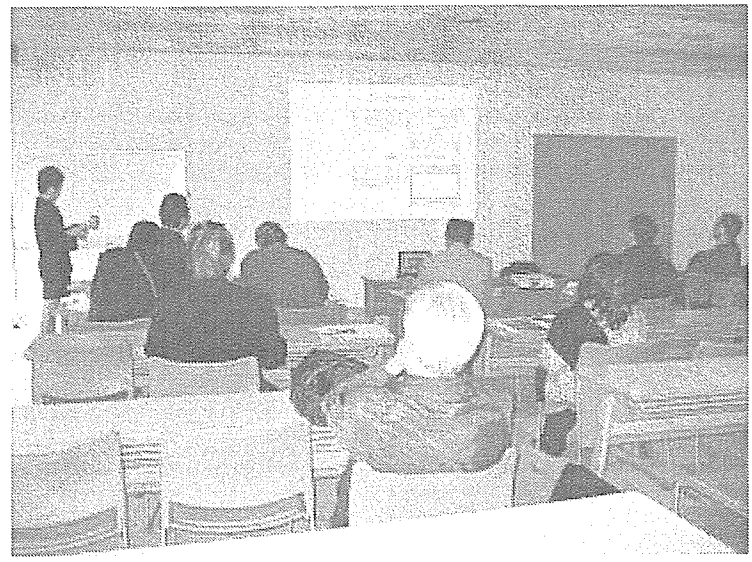
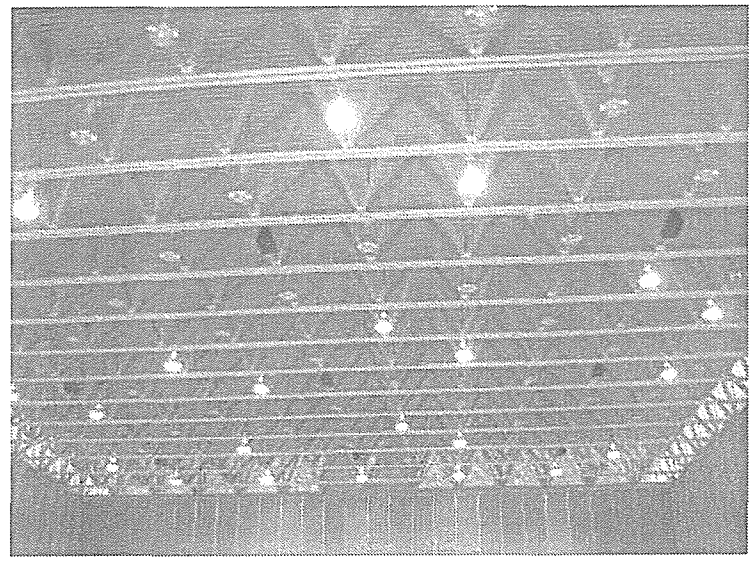
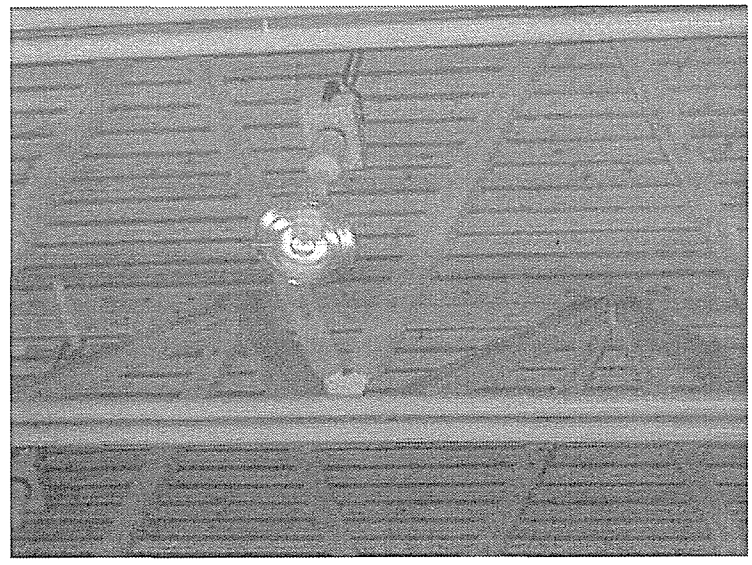
３．２　現地視察の概要

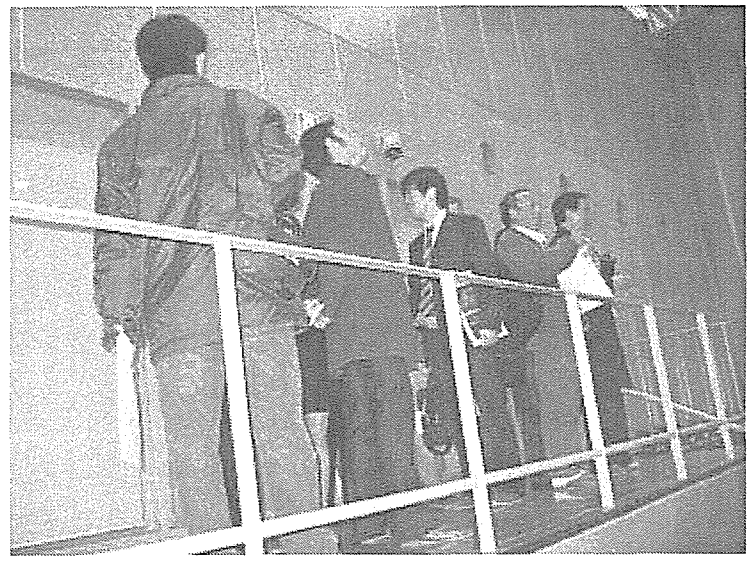
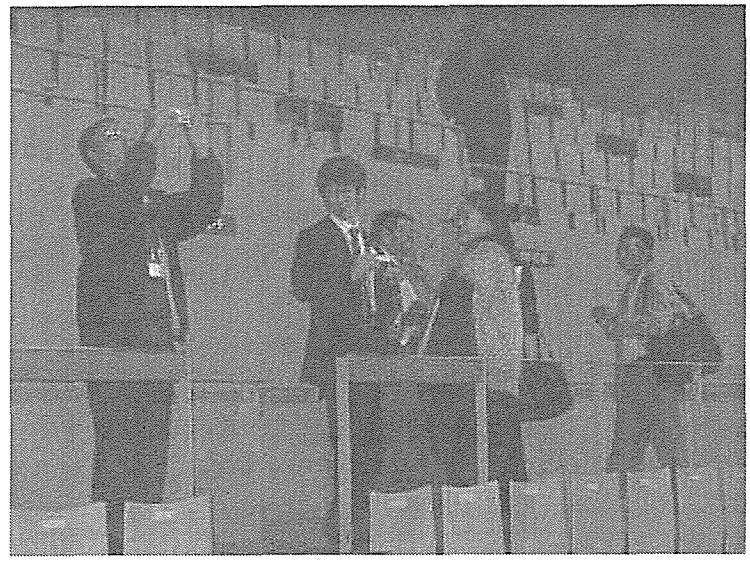
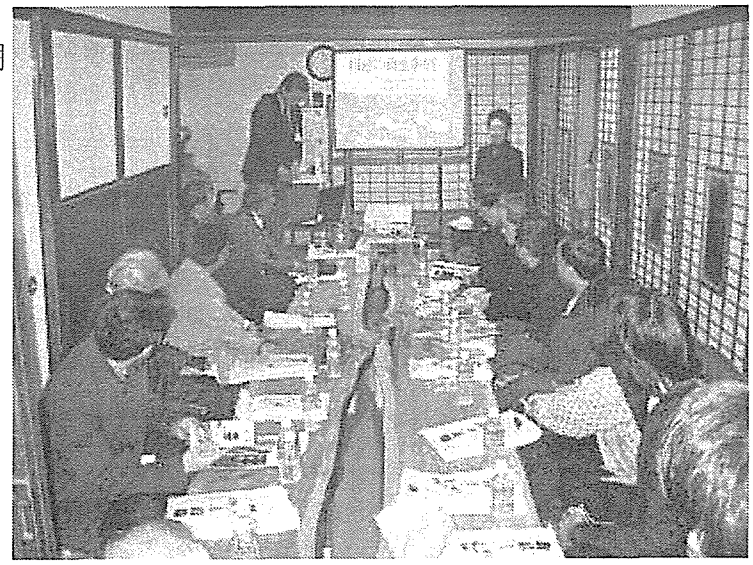
アジア８カ国から招致者を対象として、日本の木造建築の建築物や町並み、教育機関の現地視察を行う。

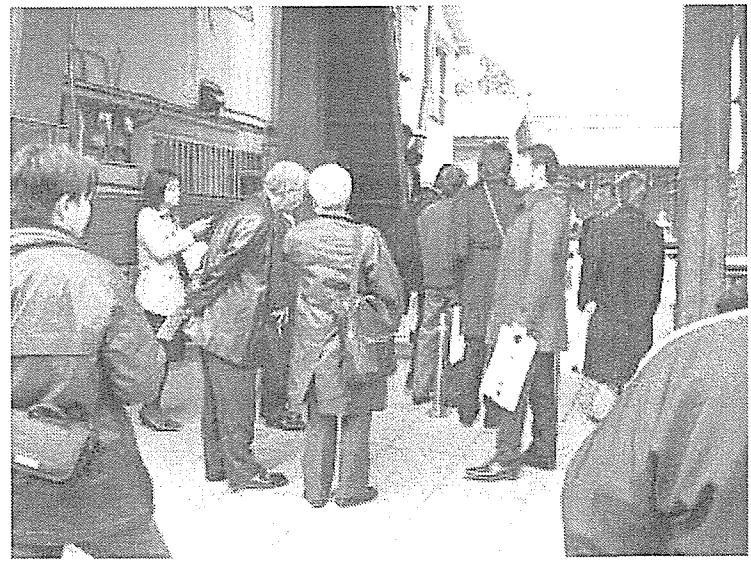
３．３　タイムスケジュール

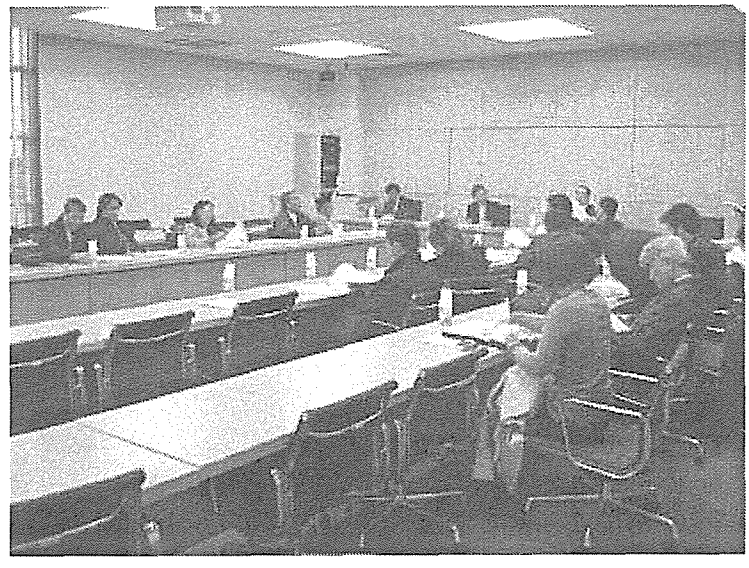
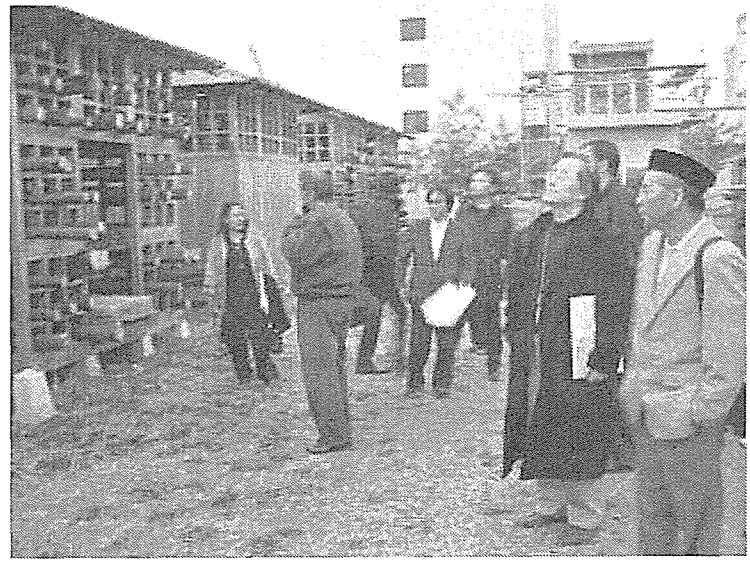
8:30　ホテル出発
10:00　所沢市民体育館　着
11:30　所沢市民体育館　発
12:30　川越周辺　着
12:30　昼食
13:30　川越周辺視察
14:30　川越周辺　発
16:00　ものつくり大学　着
17:30　ものつくり大学　発
19:00　ホテル着

３．４　現地視察の様子

所沢市民体育館の概要、計画、設計等の説明の様子	
所沢市民体育館 屋根構造	
同上	

所沢市民体育館視察の様子	
同上	
川越市役所職員による川越の町並みの説明	

川越町並みの視察の様子	
同上	
同上	

川越町並みの視察の様子	
ものつくり大学の概要説明	
ものつくり大学実習等の作業場	

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